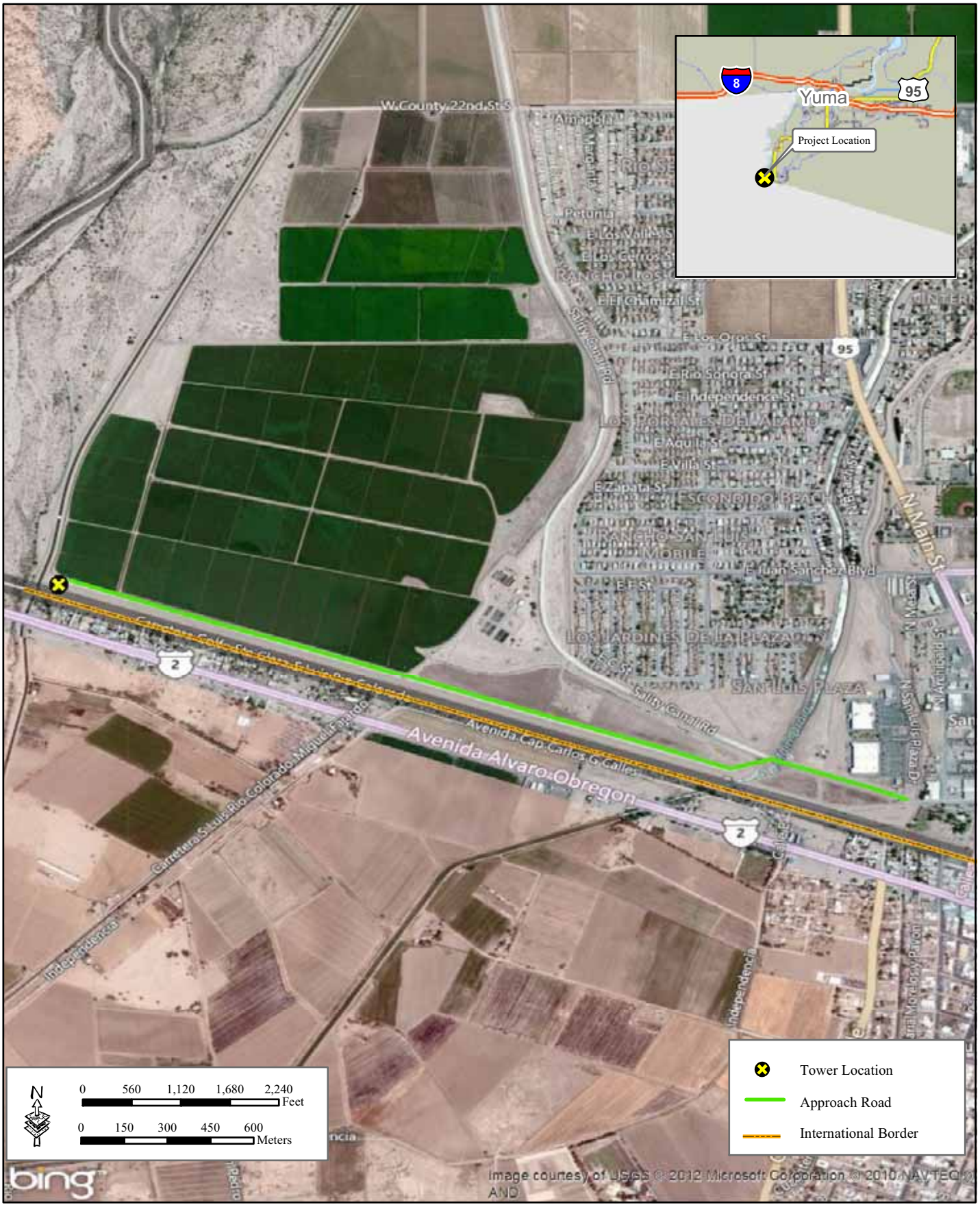
APPENDIX B
RVSS UPGRADE PROGRAM (NEW TOWERS) TOWER SITES



Appendix B-1. Project Area Map Showing the Location of YUM-YUS-0533

GSRC

August 2012

Appendix B-2. Project Area Map Showing the Location of YUM-YUS-0535

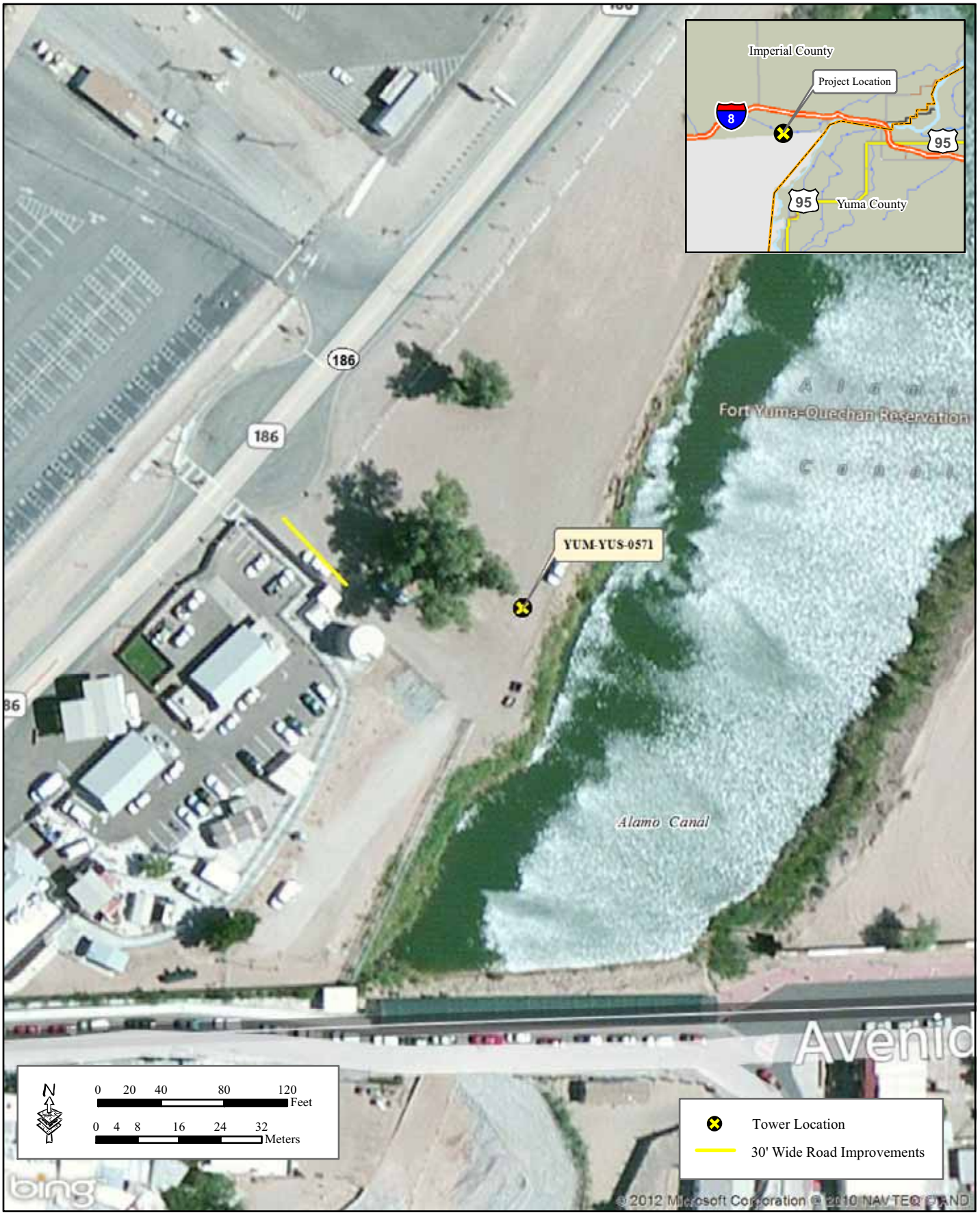
GSRC

May 2012

Appendix B-3. Project Area Map Showing the Location of
YUM-YUS-0539, YUM-YUS-0543, YUM-YUS-0547, and YUM-YUS-0549

GSRC

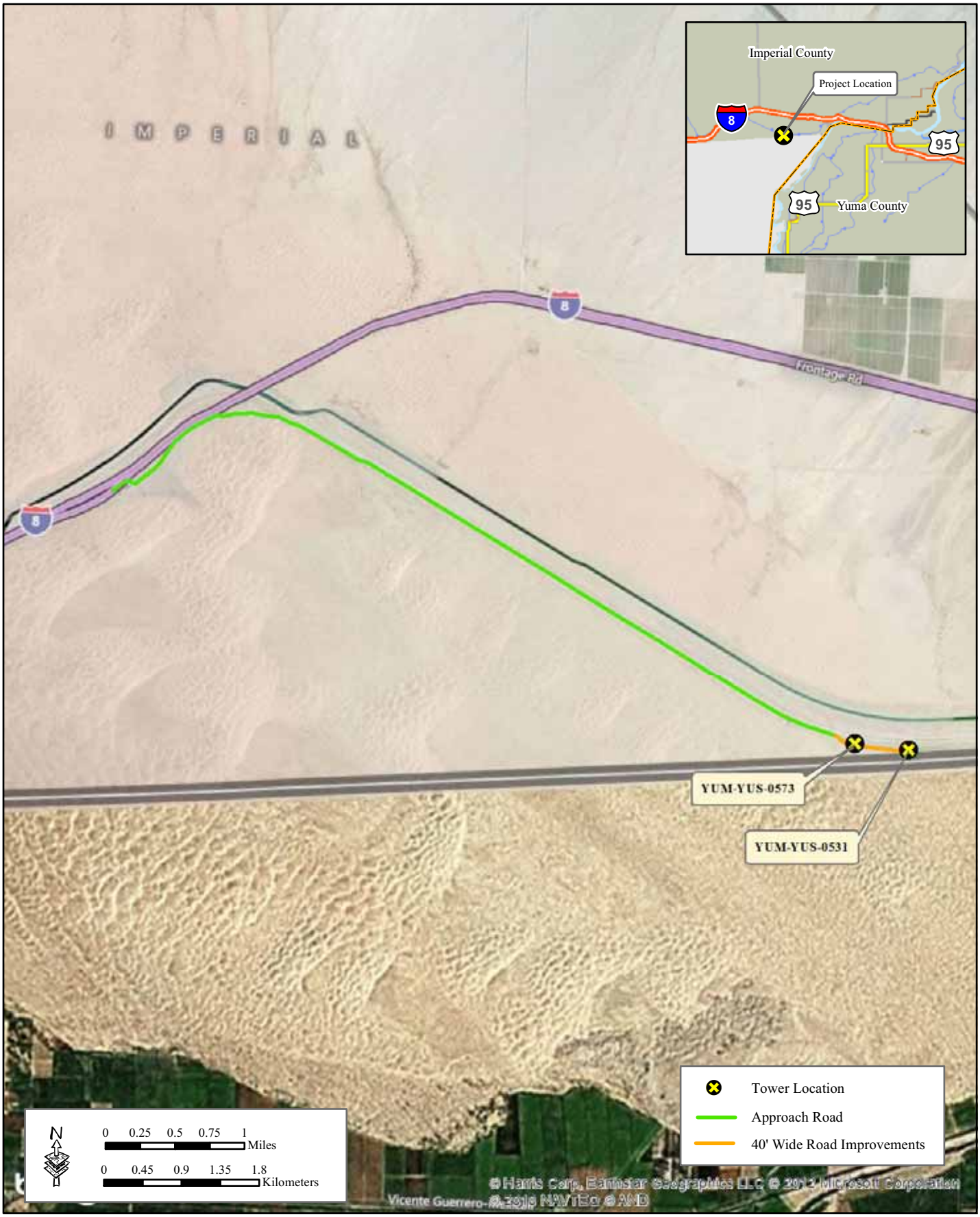
August 2012



Appendix B-4. Project Area Map Showing the Location of YUM-YUS-0571

GSRC

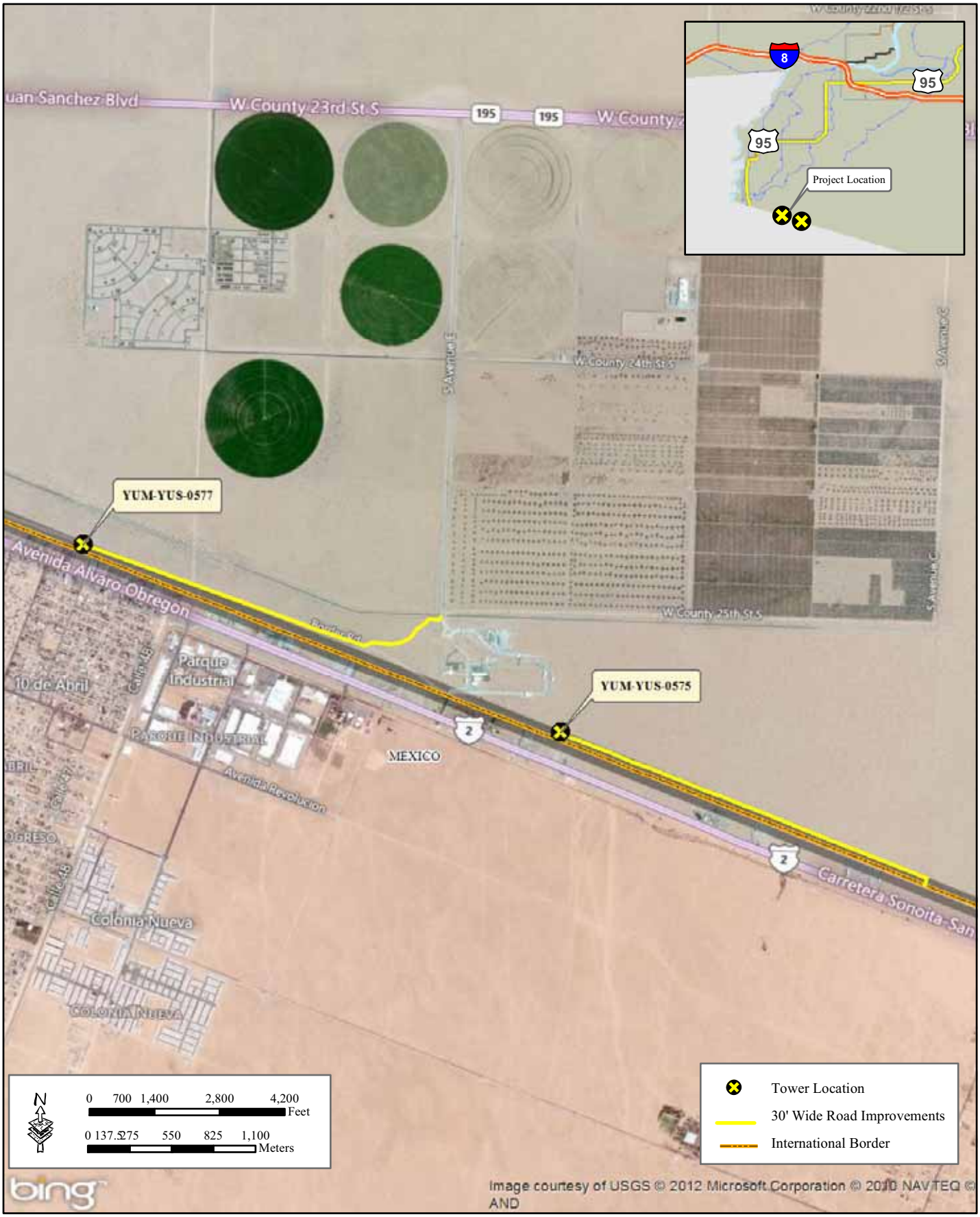
August 2012



Appendix B-5. Project Area Map Showing the Location of YUM-YUS-0573 and YUM-YUS-0531

GSRC

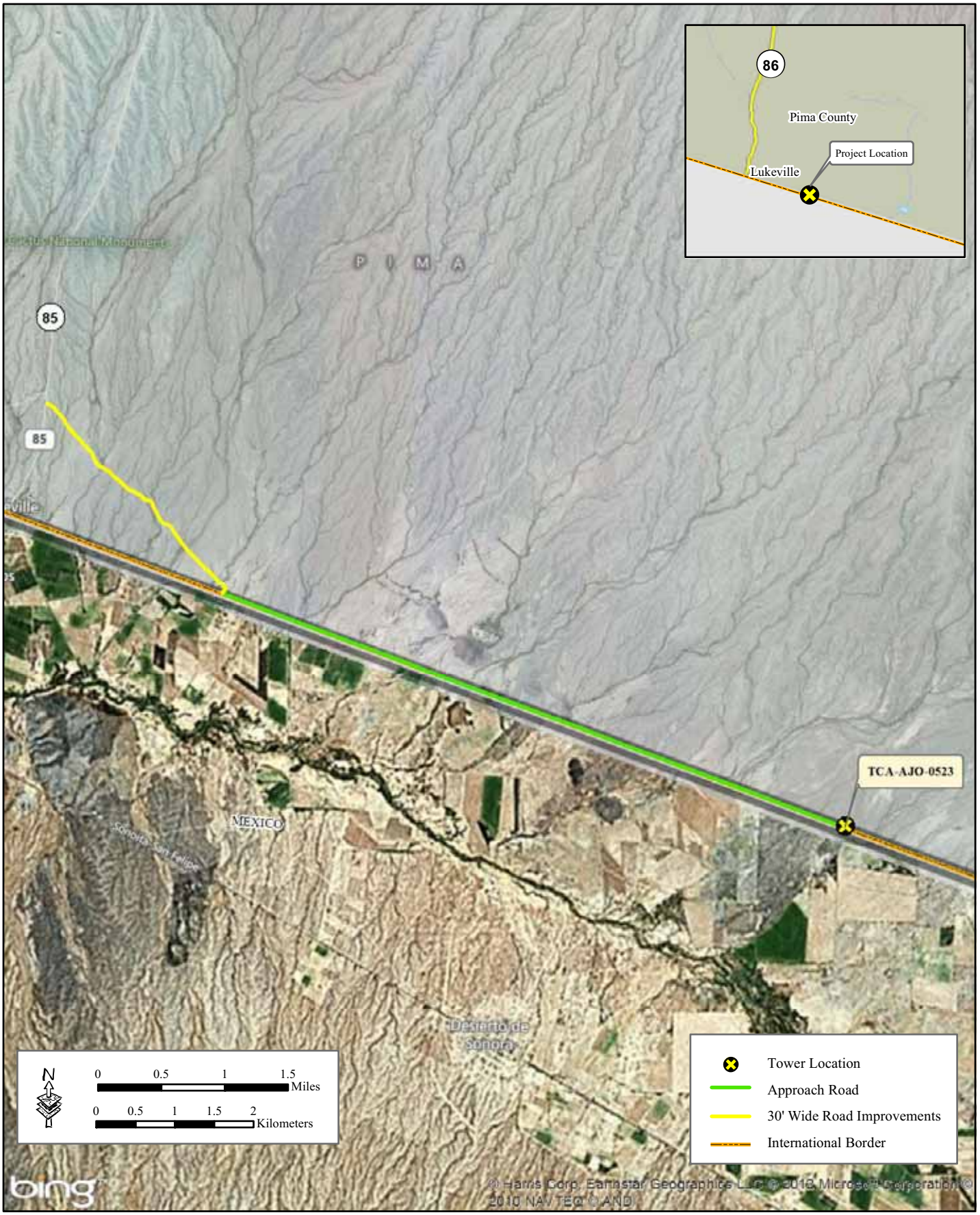
August 2012



Appendix B-6. Project Area Map Showing the Location of YUM-YUS-0575 and YUM-YUS-0577

GSRC

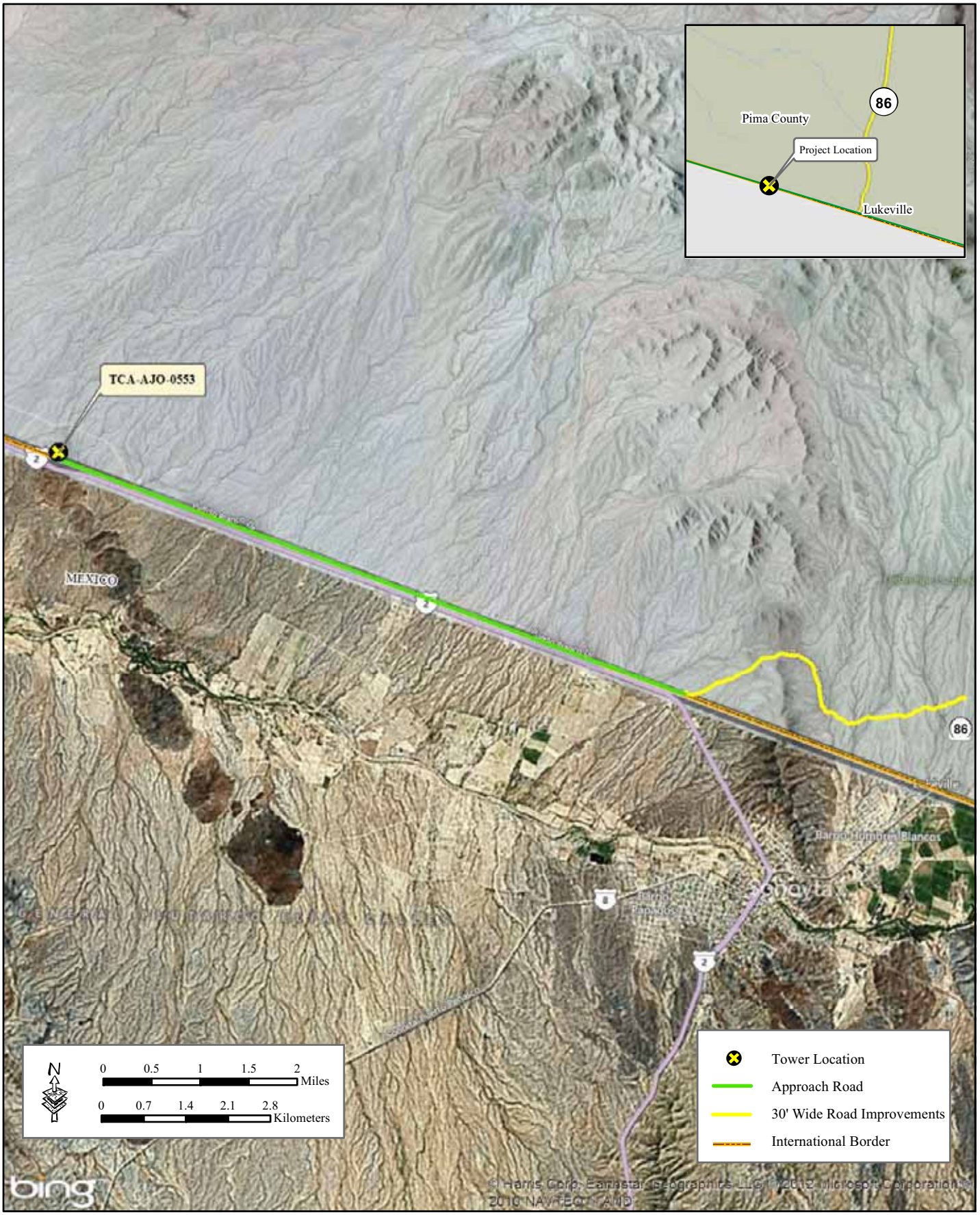
August 2012



Appendix B-7. Project Area Map Showing the Location of TCA-AJO-0523

GSRC

August 2012



Appendix B-8. Project Area Map Showing the Location of TCA-AJO-0553

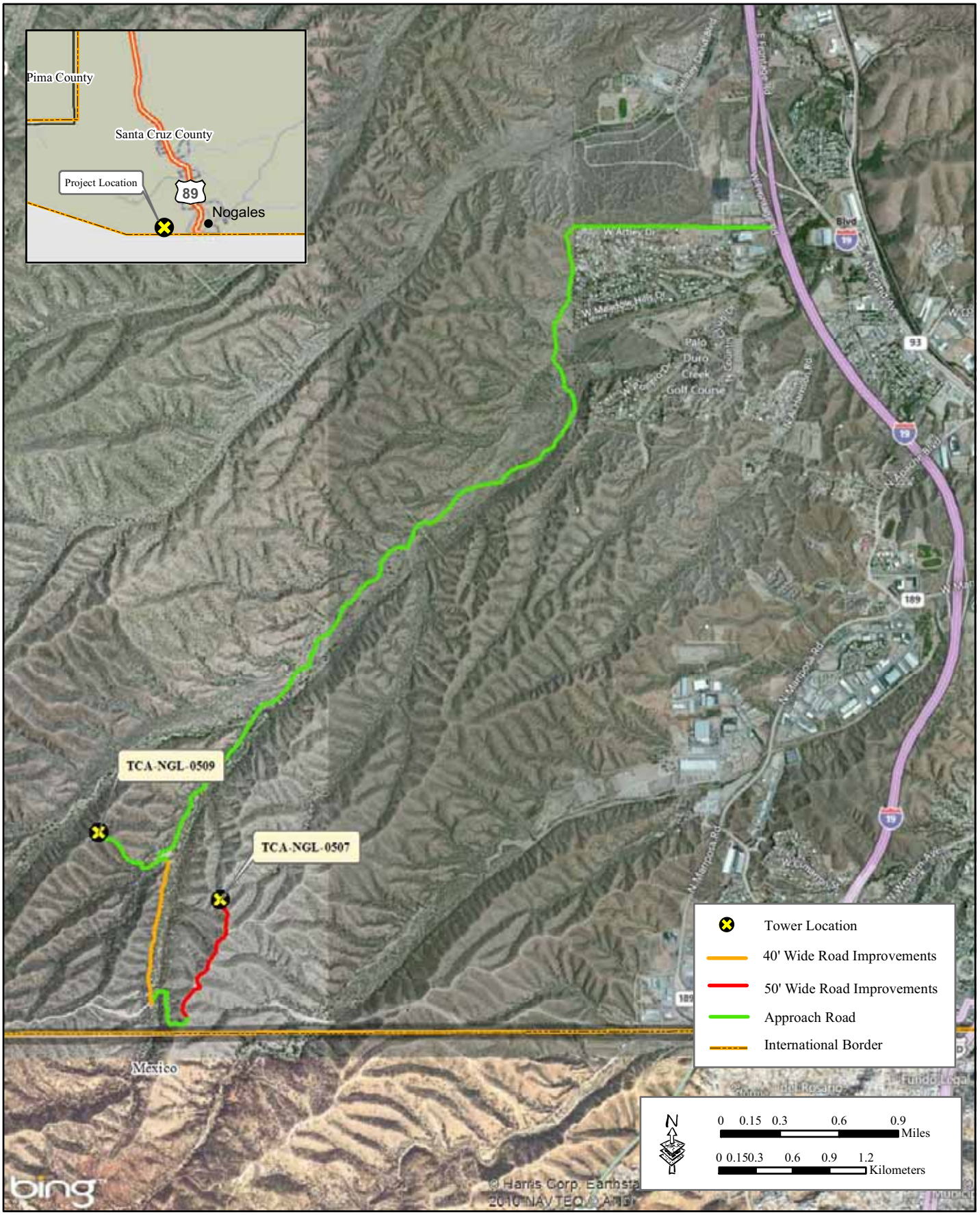
GSRC

August 2012

Appendix B-9. Project Area Map Showing the Location of TCA-NGL-0505 and TCA-NGL-0555

GSRC

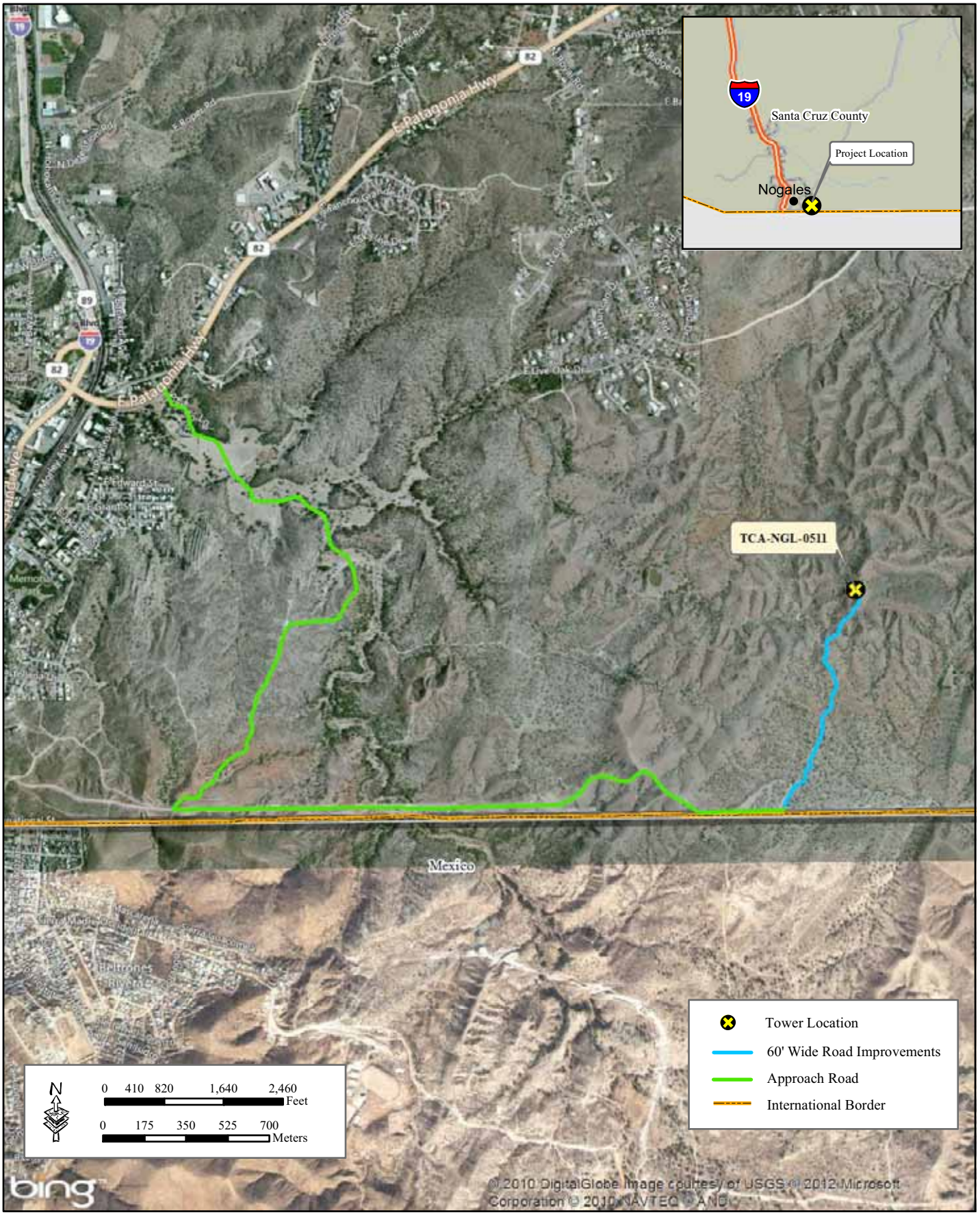
August 2012



Appendix B-10. Project Area Map Showing the Location of TCA-NGL-0507 and TCA-NGL-0509

GSRC

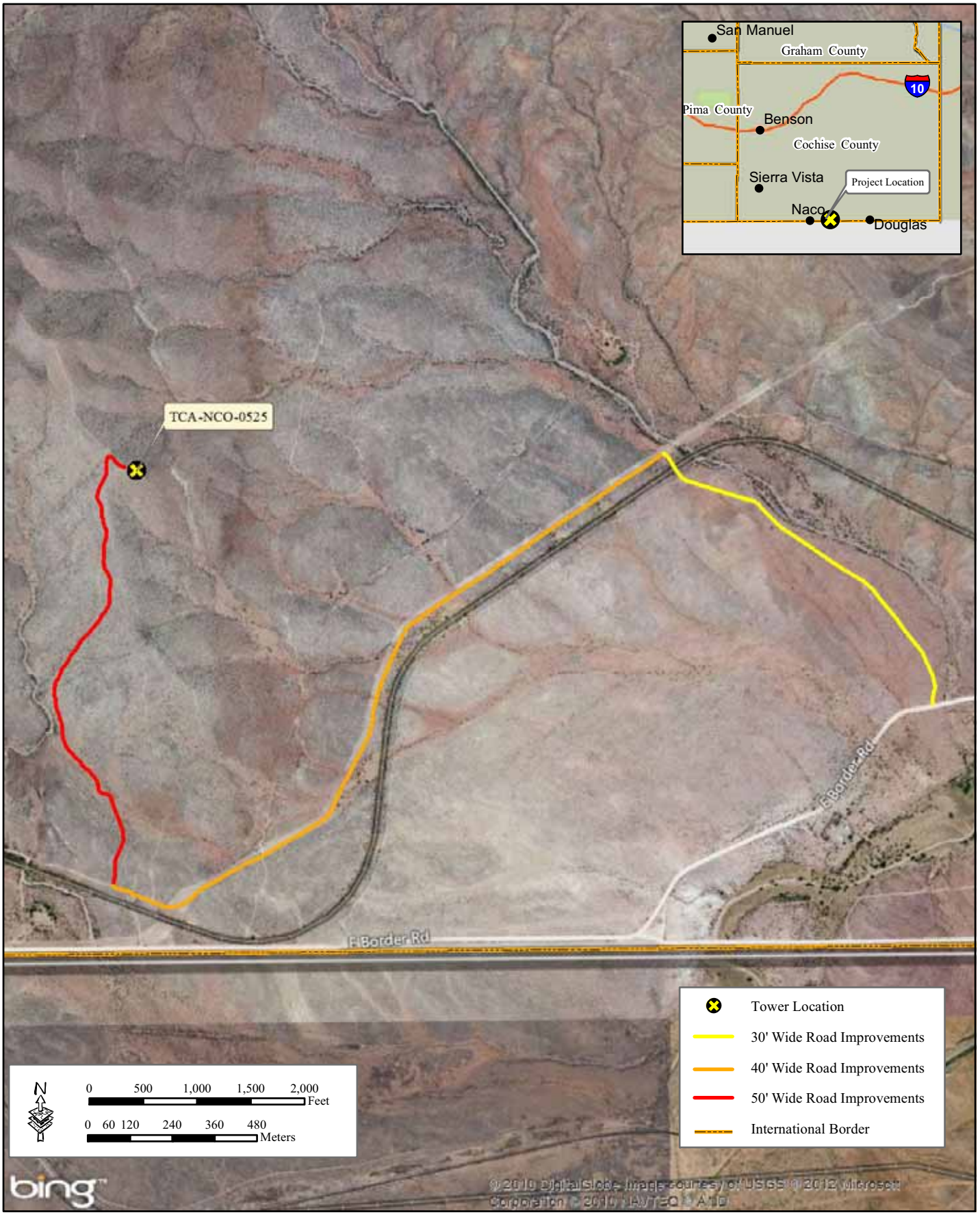
August 2012



Appendix B-11. Project Area Map Showing the Location of TCA-NGL-0511

GSRC

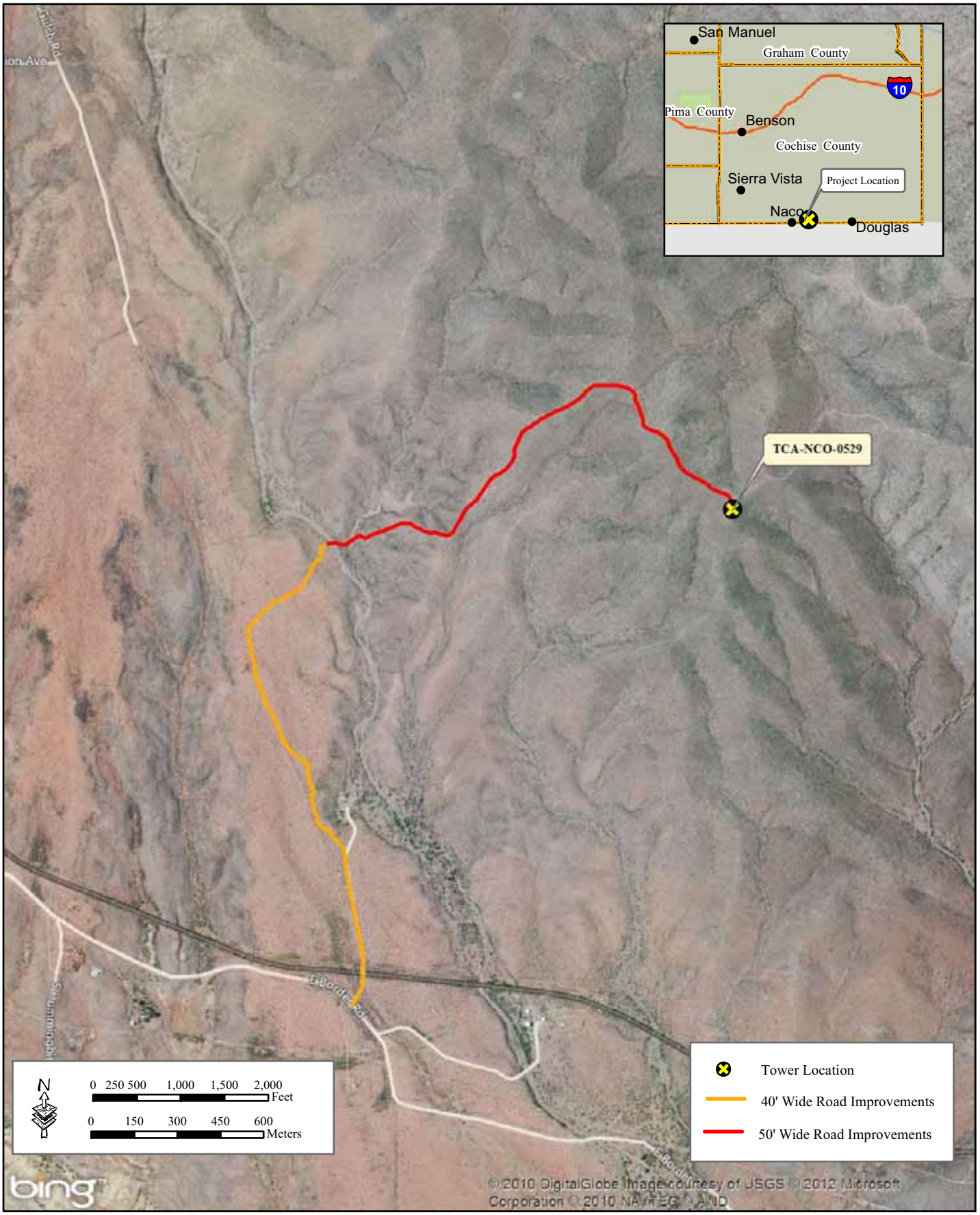
August 2012



Appendix B-12. Project Area Map Showing the Location of TCA-NCO-0525

GSRC

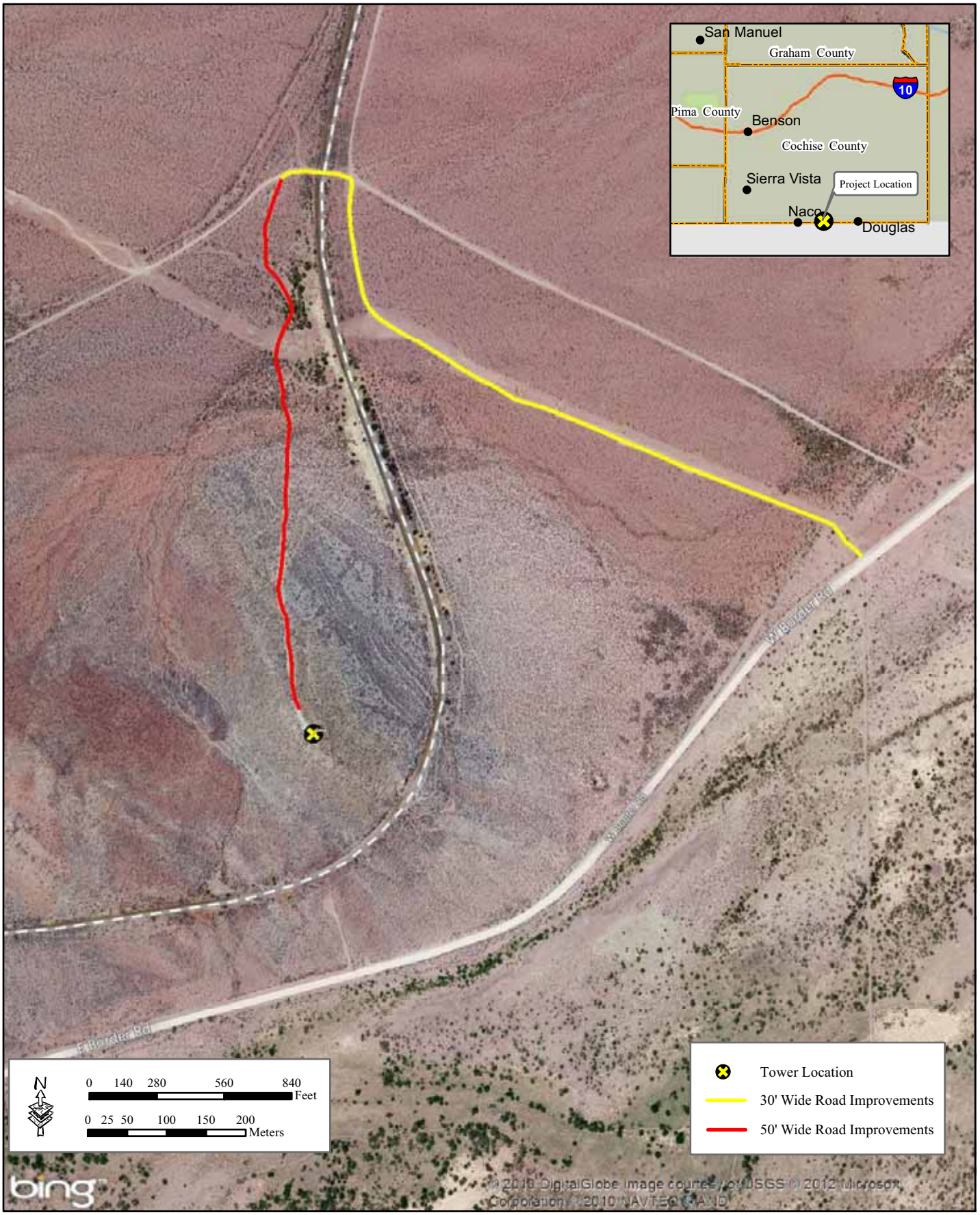
August 2012



Appendix B-13. Project Area Map Showing the Location of TCA-NCO-0529

GSRC

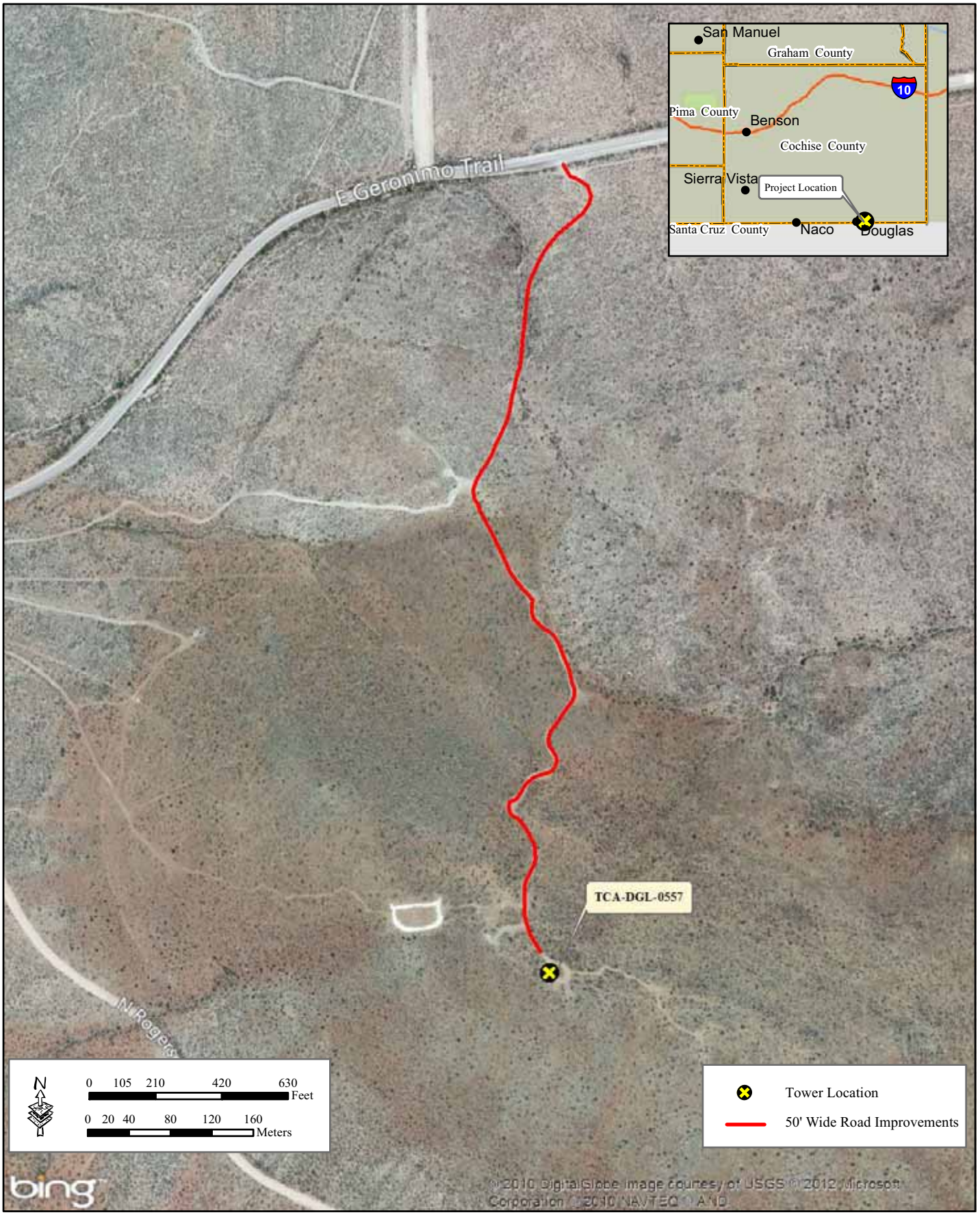
August 2012



Appendix B-14. Project Area Map Showing the Location of TCA-NCO-0567

GSRC

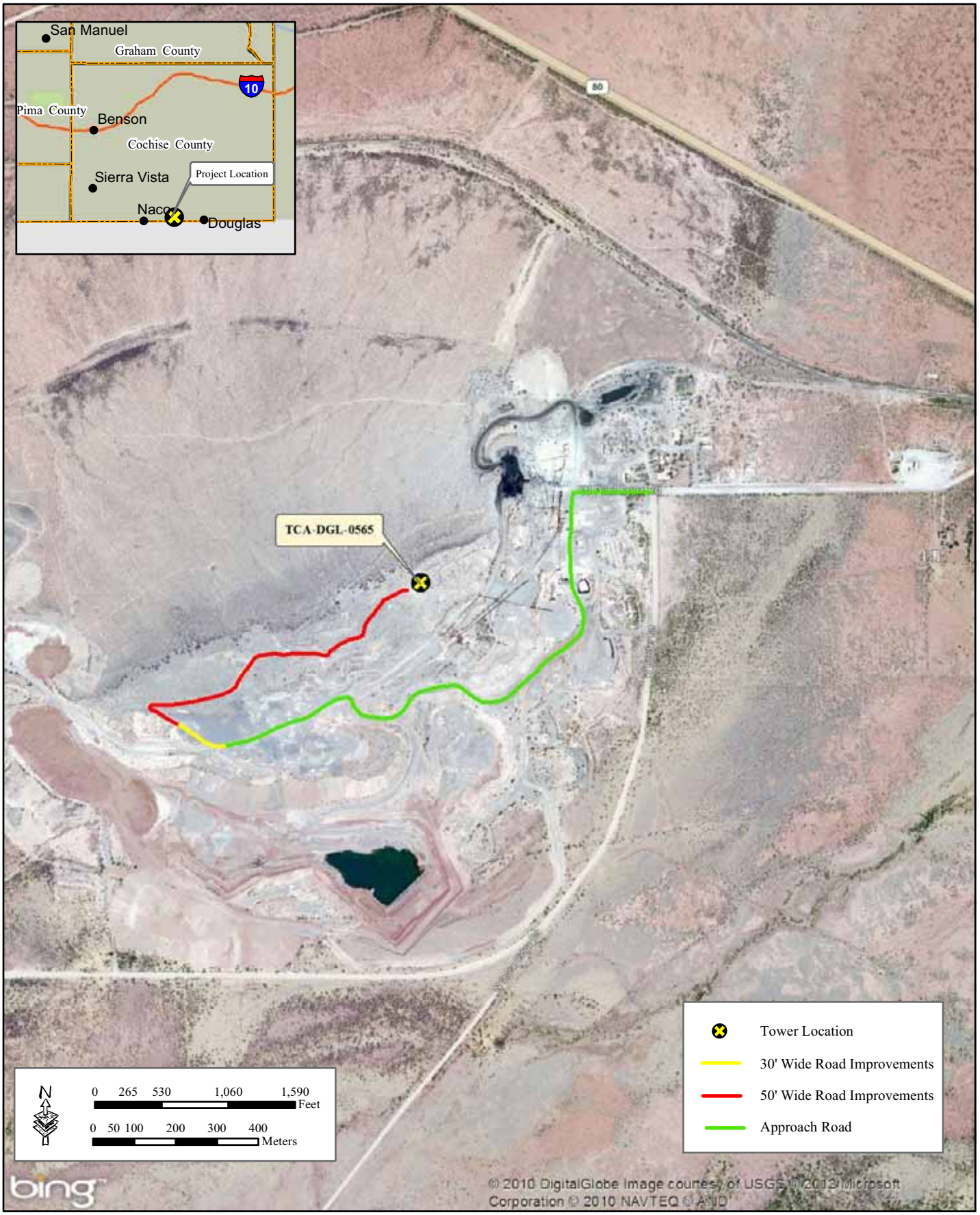
August 2012



Appendix B-15. Project Area Map Showing the Location of TCA-DGL-0557

GSRC

August 2012



Appendix B-16. Project Area Map Showing the Location of TCA-DGL-0565

GSRC

August 2012

APPENDIX C
SOIL MAPS

TCA-AJO-0523 Soils

GSRC

February 2012

TCA-AJO-0551 Soils

GSRC

February 2012

TCA-AJO-0553 Soils

GSRC

February 2012

TCA-DGL-0557 Soils

GSRC

February 2012

TCA-DGL-0559 Soils

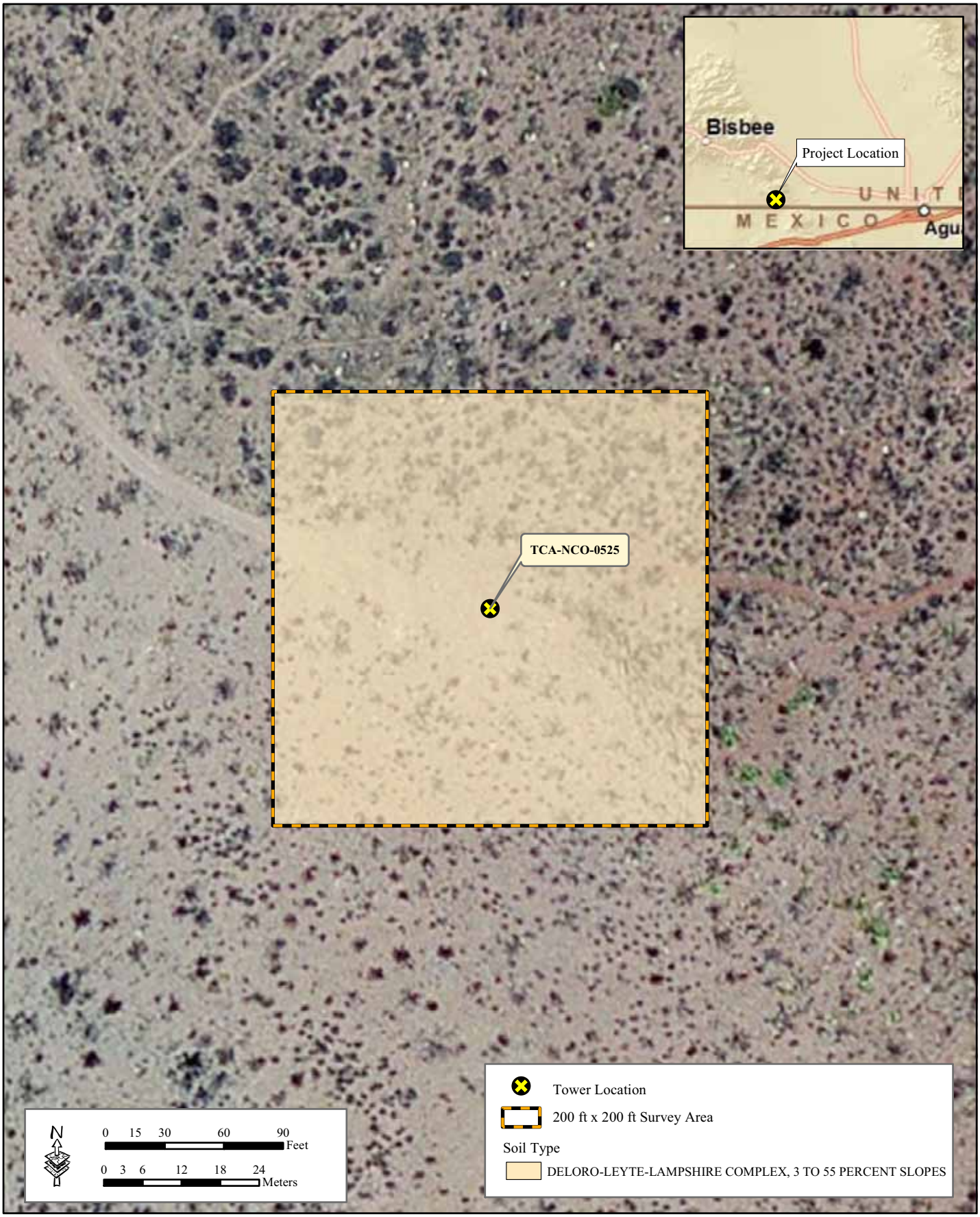
GSRC

February 2012

TCA-DGL-0565 Soils

GSRC

February 2012



TCA-NCO-0525 Soils

GSRC

February 2012

TCA-NCO-0529 Soils

GSRC

February 2012

TCA-NCO-0567 Soils

GSRC

February 2012

TCA-NGL-0503 Soils

GSRC

February 2012

TCA-NGL-0505 Soils

GSRC

February 2012

TCA-NGL-0507 Soils

GSRC

February 2012

TCA-NGL-0509 Soils

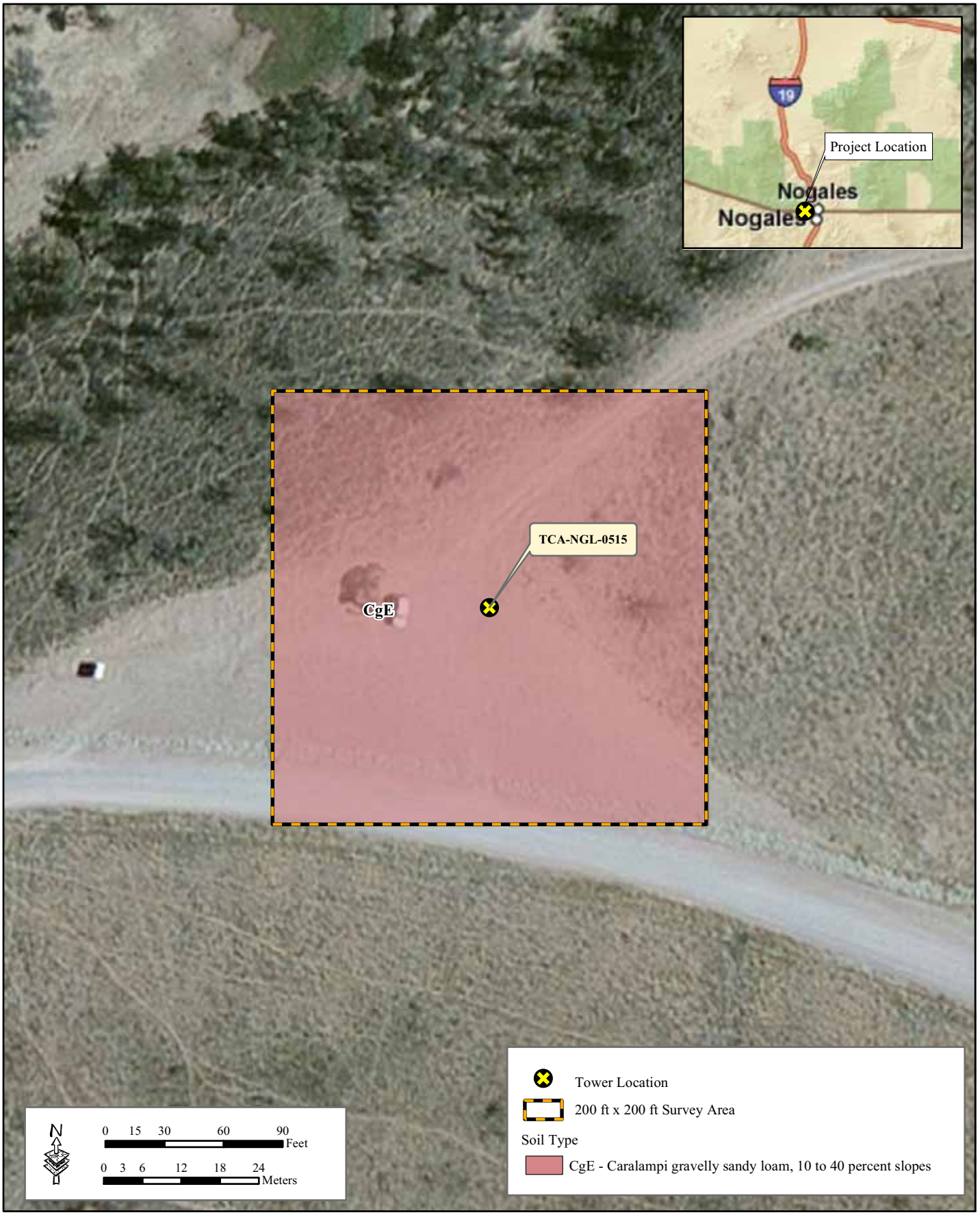
GSRC

February 2012

TCA-NGL-0511 Soils

GSRC

February 2012



TCA-NGL-0515 Soils

GSRC

February 2012

TCA-NGL-0555 Soils

GSRC

February 2012

YUM-YUS-0533 Soils

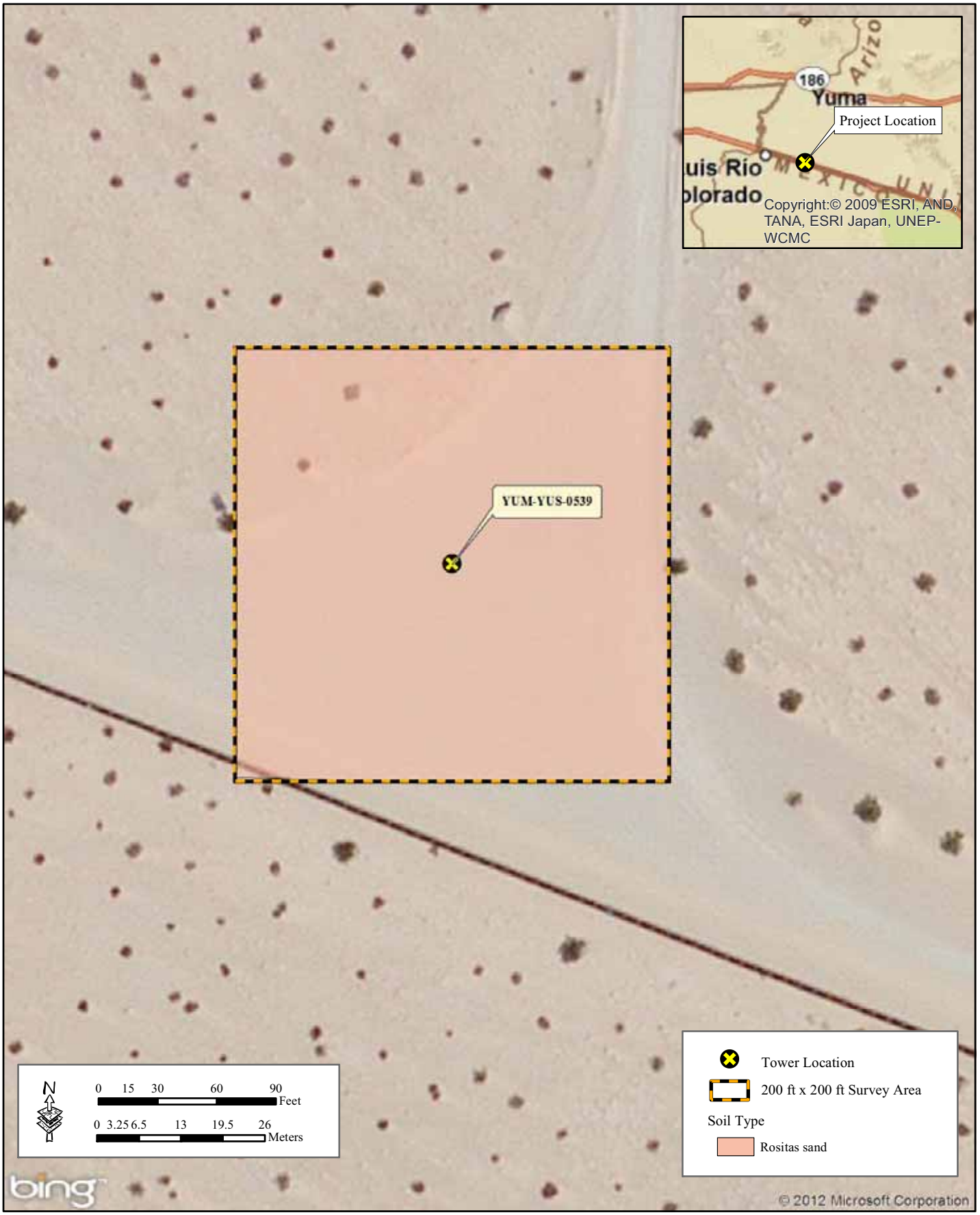
GSRC

March 2012

YUM-YUS-0535 Soils

GSRC

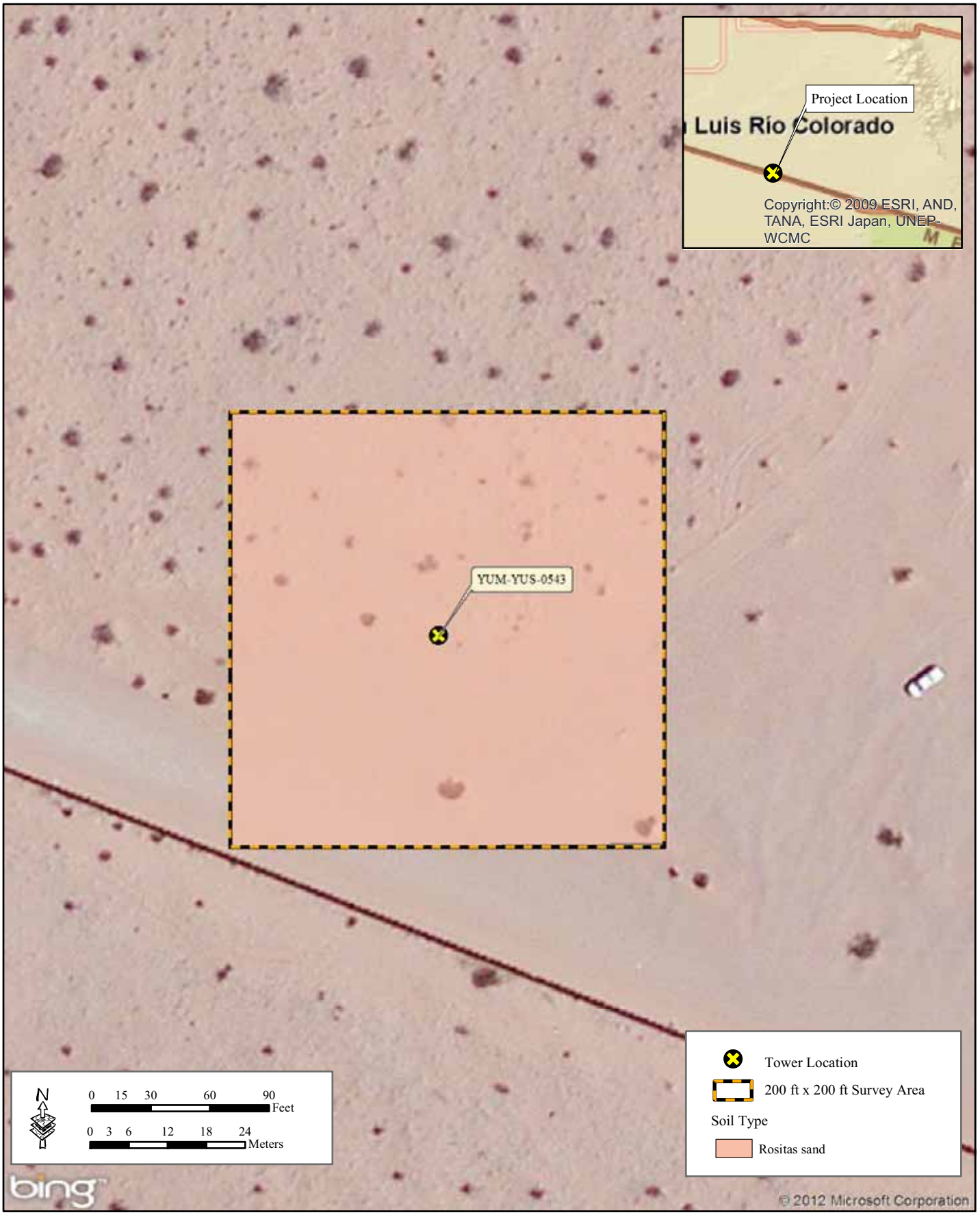
Maerch 2012



YUM-YUS-0539 Soils

GSRC

February 2012



YUM-YUS-0543 Soils

GSRC

March 2012

YUM-YUS-0547 Soils

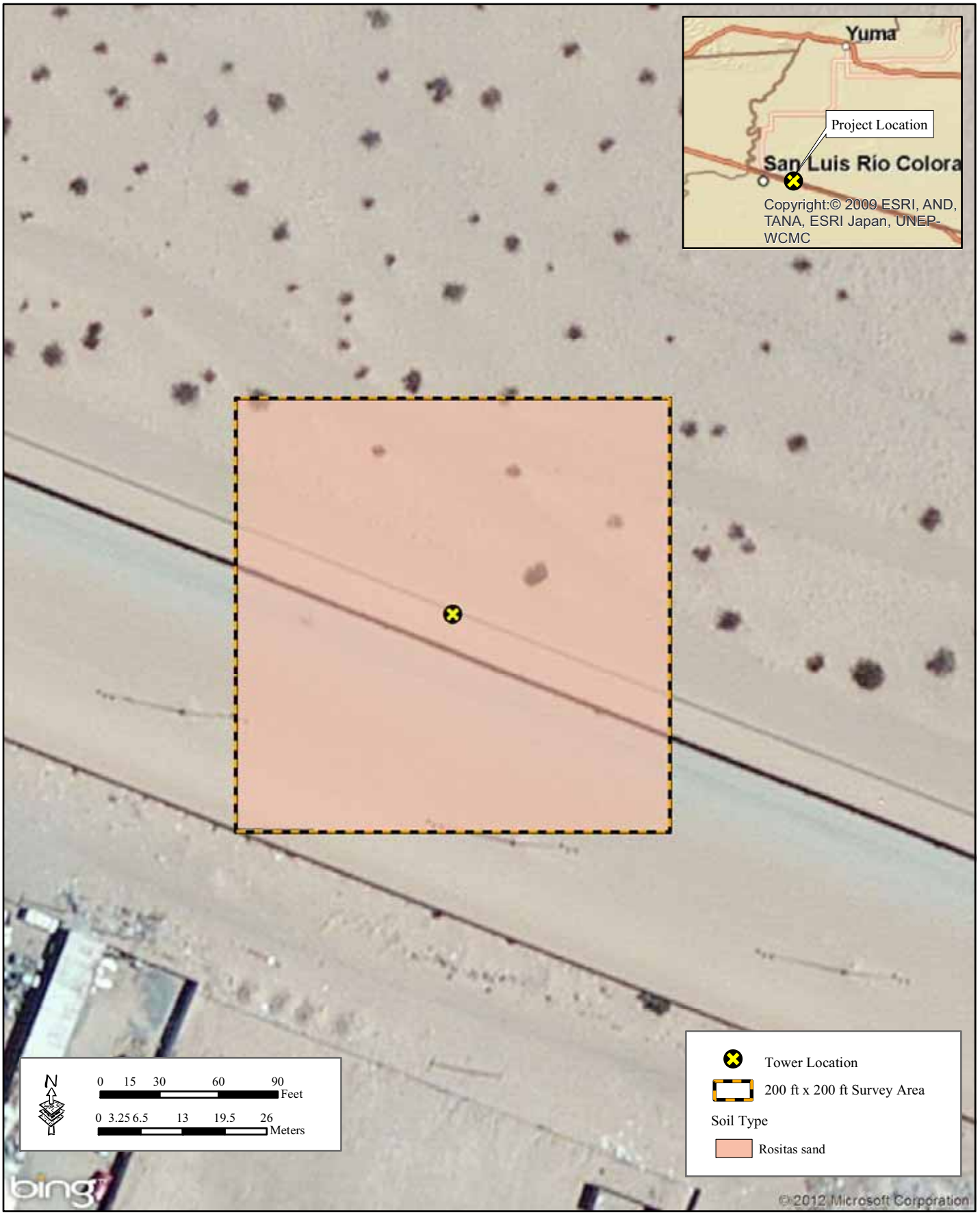
GSRC

March 2012

YUM-YUS-0549 Soils

GSRC

February 2012



YUM-YUS-0577 Soils

GSRC

March 2012

APPENDIX D
WILDLIFE OBSERVED DURING BIOLOGICAL SURVEYS

Location of Observation

Species Observed During Surveys	YUM-YUS-571	YUM-YUS-573	YUM-YUS-531	YUM-YUS-535	YUM-YUS-533	YUM-YUS-577	YUM-YUS-575	YUM-YUS-547	YUM-YUS-539	YUM-YUS-549	YUM-YUS-543	TCA-AJO-551	TCA-AJO-553	TCA-AJO-519	TCA-AJO-523	TCA-NGL-509	TCA-NGL-507	TCA-NGL-505	TCA-NGL-503	TCA-NGL-555	TCA-NGL-515	TCA-NCO-529	TCA-NCO-567	TCA-NCO-525	TCA-DGL-559	TCA-DGL-561	TCA-DGL-563	TCA-DGL-565	TCA-DGL-557	TCA-DGL-511
Black-tailed jackrabbit (*Lepus californicus*)												x																		
Cottontail rabbit (*Sylvilagus* sp.)																														x	
Banner-tailed kangaroo rat (*Dipodomys spectabilis*)																								x						
Antilope jackrabbit (*Lepus alleni*)																														x
Rock squirrel (*Ostospermophilus variegatus*)												x		x		x		x											x	x
White-throated woodrat (*Neotoma albigular*)												x		x	x														x	x
Coyote (*Canis latrans*)																								x						x
Mule deer (*Odocoileus hemionus*)																						x							x	x
Kit fox (*Vulpes macrotis*)																								x						
Round-tailed ground squirrel (*Xerospermophilus tereticaudus*)												x			x														x	x
American badger (*Taxidea taxus*)																								x						
Rock wren (*Salpinctes obsoletus*)														x															x	
American kestrel (*Falco sparverius*)															x															
Black-tailed gnatcatcher (*Polioptila melanura*)																								x						
Black-throated sparrow (*Aimphila quinquestriata*)												x				x				x	x	x		x				x		x
Cactus wren (*Campylorhynchus brunneicapillus*)														x								x								
Canyon towhee (*Pipilo fuscus*)																													x	
Common raven (*Corvus corax*)														x		x				x										x
Curve-billed thrasher (*Toxostoma curvirostre*)												x										x		x						
Gamble's quail (*Callipepla gambelii*)												x	x			x													x	x
Greater roadrunner (*Geococcyx californianus*)													x						x											
Chihuahuan raven (*Corvus cryptluecus*)																							x		x	x	x			
House finch (*Carpodacus mexicanus*)																														x
Ladder-backed woodpecker (*Picoides scalaris*)																														x
Loggerhead shrike (*Lanius ludovicianus*)				x																			x							
Mourning dove (*Zenaida macroura*)	x											x				x						x		x						x
Northern flicker (*Colaptes auratus*)																x														
Red-tailed hawk (*Buteo jamaicensis*)																								x						x
Verdin (*Auriparus flaviceps*)												x			x															
Osprey (*Pandion haliaetus*)				x																										
Double-crested cormorant (*Phalacrocorax auritus*)				x																										
Ring-billed gull (*Larus delawarensis*)				x																										

Location of Observation

Species Observed During Surveys	YUM-YUS-571	YUM-YUS-573	YUM-YUS-531	YUM-YUS-535	YUM-YUS-533	YUM-YUS-577	YUM-YUS-575	YUM-YUS-547	YUM-YUS-539	YUM-YUS-549	YUM-YUS-543	TCA-AJO-551	TCA-AJO-553	TCA-AJO-519	TCA-AJO-523	TCA-NGL-509	TCA-NGL-507	TCA-NGL-505	TCA-NGL-503	TCA-NGL-555	TCA-NGL-515	TCA-NCO-529	TCA-NCO-567	TCA-NCO-525	TCA-DGL-559	TCA-DGL-561	TCA-DGL-563	TCA-DGL-565	TCA-DGL-557	TCA-DGL-511
Great blue heron (*Ardea herodias*)					x																									
Rock dove (*Columba livia*)				x	x																									x
Brown-headed cowbird (*Molothrus ater*)																						x								
Say's phoebe (*Sayornis saya*)																											x			x
Northern harrier (*Circus cyaneus*)																								x						
White-crowned sparrow (*Zonotrichia leucophrys*)																								x						x
Chipping sparrow (*Spizella passerina*)																														x
Savannah sparrow (*Passerculus sandwichensis*)																														x
Turkey vulture (*Cathartes aura*)	x			x										x		x	x	x	x		x		x							x
Barn swallow (*Hirundo rustica*)																					x									
Lark bunting (*Calamospiza melanocorys*)																						x								
Sharp-shinned hawk (*Accipiter striatus*)																								x						x
Mallard (*Anas platyrhynchos*)	x																													
Great-tailed grackel (*Quiscalus mexicanus*)	x																													
Red-winged blackbird (*Agelaius phoeniceus*)	x																													
Tiger whiptail (*Aspidoscelis tigris*)												x			x		x													
Desert grassland whiptail (*Aspidoscelis uniparens*)																													x	x
Ornate tree lizard (*Urosaurus ornatus*)												x		x		x	x						x			x				x
Desert iguana (*Dipsosaurus dorsalis*)	x							x	x	x	x																			
Sidewinder (*Crotalus cerastes*)									x		x																			
Common side-blotched lizard (*Uta stansburiana*)	x											x		x	x		x													x

APPENDIX E
ARIZONA AND CALIFORNIA STATE-PROTECTED SPECIES LISTS

Element Status Designations by County, Taxon, Scientific Name
Arizona Game and Fish Department, Heritage Data management System
Updated: July 02, 2012

COUNTY	TAXON	SCIENTIFIC NAME	COMMON NAME	ESA	BLM	CRIT HAB	USFS	NESL	MEXFED	STATE	ELCODE	S RANK	G RANK
Cochise	AMPHIBIAN	Ambystoma mavortium stebbinsi	Sonora Tiger Salamander	LE					PR	WSC	AAAAA01145	S1	G5T1T2
Cochise	AMPHIBIAN	Anaxyrus debilis insidior	Western Green Toad						PR		AAABB01062	S3	G5T5
Cochise	AMPHIBIAN	Craugastor augusti cactorum	Western Barking Frog				S			WSC	AAABD04171	S2	G5T5
Cochise	AMPHIBIAN	Hyla wrightorum (Huachuca/Canelo Pop.)	Arizona Treefrog (Huachuca/Canelo DPS)	C,DPS							AAABC02082	S1	G4T2
Cochise	AMPHIBIAN	Lithobates chiricahuensis	Chiricahua Leopard Frog	LT		Y			A	WSC	AAABH01080	S2	G3
Cochise	AMPHIBIAN	Rana blairi	Plains Leopard Frog		S		S			WSC	AAABH01040	S1	G5
Cochise	AMPHIBIAN	Rana yavapaiensis	Lowland Leopard Frog	SC	S		S		PR	WSC	AAABH01250	S3	G4
Cochise	AMPHIBIAN	Spea bombifrons	Plains Spadefoot								AAABF02010	S4	G5
Cochise	BIRD	Accipiter gentilis	Northern Goshawk	SC	S		S	4	A	WSC	ABNKC12060	S3B	G5
Cochise	BIRD	Amazilia beryllina	Berylline Hummingbird								ABNUC29080	S1	G4
Cochise	BIRD	Amazilia violiceps	Violet-crowned Hummingbird				S			WSC	ABNUC29150	S3	G5
Cochise	BIRD	Ammodramus bairdii	Baird's Sparrow	SC			S			WSC	ABPBXA0010	S2N	G4
Cochise	BIRD	Ammodramus savannarum ammolegus	Arizona grasshopper sparrow		S		S				ABPBXA0021	S1S2	G5TU
Cochise	BIRD	Anas platyrhynchos diazi	Mexican Duck								ABNJB10062	S4	G5T5
Cochise	BIRD	Anthus spragueii	Sprague's Pipit	C						WSC	ABPBM02060	S2N	G4
Cochise	BIRD	Aquila chrysaetos	Golden Eagle		S			3	P		ABNKC22010	S4	G5
Cochise	BIRD	Ardea herodias	Great Blue Heron						|		ABNGA04010	S5	G5
Cochise	BIRD	Athene cunicularia hypugaea	Western Burrowing Owl	SC	S		S	4	A		ABNSB10012	S3	G4T4
Cochise	BIRD	Basileuterus rufifrons	Rufous-capped Warbler								ABPBX21020	SAB	G4G5
Cochise	BIRD	Buteo albonotatus	Zone-tailed Hawk				S				ABNKC19090	S4	G4
Cochise	BIRD	Buteo nitidus maxima	Northern Gray Hawk	SC			S		PR	WSC	ABNKC19011	S3	G5T4Q
Cochise	BIRD	Buteo swainsoni	Swainson's Hawk				S				ABNKC19070	S3	G5
Cochise	BIRD	Buteogallus anthracinus	Common Black-Hawk				S		A	WSC	ABNKC15010	S3	G4G5
Cochise	BIRD	Calothorax lucifer	Lucifer Hummingbird				S				ABNUC44010	S2	G4G5
Cochise	BIRD	Camptostoma imberbe	Northern Beardless-Tyrannulet				S				ABPAE04010	S4	G5
Cochise	BIRD	Caprimulgus ridgwayi	Buff-collared Nightjar				S				ABNTA07060	S2S3	G5
Cochise	BIRD	Catharus ustulatus	Swainson's Thrush								ABPBJ18100	S1	G5
Cochise	BIRD	Chloroceryle americana	Green Kingfisher								ABNXD02020	S2	G5
Cochise	BIRD	Coccothraustes vespertinus	Evening Grosbeak								ABPBY09020	S3	G5
Cochise	BIRD	Coccyzus americanus	Yellow-billed Cuckoo (Western U.S. DPS)	PS:C			S	2		WSC	ABNRB02020	S3	G5
Cochise	BIRD	Dendrocygna autumnalis	Black-bellied Whistling-Duck							WSC	ABNJB01040	S3	G5
Cochise	BIRD	Dumetella carolinensis	Gray Catbird				S			WSC	ABPBK01010	S1	G5
Cochise	BIRD	Elanus leucurus	White-tailed Kite								ABNKC06010	S2B,S2S3N	G5
Cochise	BIRD	Empidonax fulvifrons pygmaeus	Northern Buff-breasted Flycatcher	SC			S			WSC	ABPAE33141	S1	G5T5
Cochise	BIRD	Empidonax traillii extimus	Southwestern Willow Flycatcher	LE		Y		2		WSC	ABPAE33043	S1	G5T1T2
Cochise	BIRD	Euptilotis neoxenus	Eared Quetzal				S		A		ABNWA03010	SAB,S1N	G3
Cochise	BIRD	Falco peregrinus anatum	American Peregrine Falcon	SC	S		S	4	A	WSC	ABNKD06071	S4	G4T4
Cochise	BIRD	Haliaeetus leucocephalus (wintering pop.)	Bald Eagle - Winter Population	SC	S		S	2	P	WSC	ABNKC10015	S4N	G5TNR
Cochise	BIRD	Himantopus mexicanus	Black-necked Stilt								ABNND01010	S2	G5
Cochise	BIRD	Icterus bullockii	Bullock's Oriole								ABPBXB9220	S4BS1N	G5
Cochise	BIRD	Ictinia mississippiensis	Mississippi Kite						A	WSC	ABNKC09010	S3	G5
Cochise	BIRD	Lampornis clemenciae	Blue-throated Hummingbird								ABNUC34040	S4	G5
Cochise	BIRD	Peucaea carpalis	Rufous-winged Sparrow								ABPBX91080	S3	G4
Cochise	BIRD	Plegadis chihi	White-faced Ibis	SC			S				ABNGE02020	S?B,S2S3N	G5
Cochise	BIRD	Polioptila nigriceps	Black-capped Gnatcatcher							WSC	ABPBJ08040	S1	G5
Cochise	BIRD	Recurvirostra americana	American Avocet								ABNND02010	S2	G5
Cochise	BIRD	Sialia sialis fulva	Azure Bluebird								ABPBJ15012	S3	G5TU
Cochise	BIRD	Spinus tristis	American Goldfinch						A		ABPBY06110	S1B,S5N	G5
Cochise	BIRD	Strix occidentalis lucida	Mexican Spotted Owl	LT		Y		3	A	WSC	ABNSB12012	S3S4	G3T3
Cochise	BIRD	Tachybaptus dominicus	Least Grebe								ABNCA01010	SAB	G5
Cochise	BIRD	Trogon elegans	Elegant Trogon							WSC	ABNWA02070	S3	G5
Cochise	BIRD	Tyrannus crassirostris	Thick-billed Kingbird				S			WSC	ABPAE52040	S2	G5
Cochise	BIRD	Tyrannus melancholicus	Tropical Kingbird							WSC	ABPAE52010	S3	G5
Cochise	FISH	Agosia chrysogaster chrysogaster	Gila Longfin Dace	SC	S		S		A		AFCJB37151	S3S4	G4T3T4
Cochise	FISH	Agosia chrysogaster ssp. 1	Yaqui Longfin Dace	SC	S		S		A		AFCJB37152	S1	G4T1
Cochise	FISH	Campostoma ornatum	Mexican Stoneroller	SC			S		P	WSC	AFCJB03030	S1	G3
Cochise	FISH	Catostomus clarkii	Desert Sucker	SC	S		S				AFCJC02040	S3S4	G3G4
Cochise	FISH	Catostomus insignis	Sonora Sucker	SC	S		S		P		AFCJC02100	S3	G3
Cochise	FISH	Cyprinella formosa	Beautiful Shiner	LT		Y			A	WSC	AFCJB49080	S1	G2
Cochise	FISH	Cyprinodon macularius	Desert Pupfish	LE		Y			P	WSC	AFCNB02060	S1	G1
Cochise	FISH	Gila intermedia	Gila Chub	LE		Y			P	WSC	AFCJB13160	S2	G2

COUNTY	TAXON	SCIENTIFIC NAME	COMMON NAME	ESA	BLM	CRIT HAB	USFS	NESL	MEXFED	STATE	ELCODE	S RANK	G RANK
Cochise	FISH	Gila purpurea	Yaqui Chub	LE		Y			P	WSC	AFCJB13140	S1	G1
Cochise	FISH	Ictalurus pricei	Yaqui Catfish	LT		Y			PR	WSC	AFCKA01090	S1	G2
Cochise	FISH	Poeciliopsis occidentalis sonoriensis	Yaqui Topminnow	LE					A	WSC	AFCNC05022	S1	G3T3
Cochise	FISH	Rhinichthys osculus	Speckled Dace	SC	S				P		AFCJB37050	S3S4	G5
Cochise	INVERTEBRATE	Agathymus aryxna	Arizona Giant Skipper								IILEP87080	S5	G4G5
Cochise	INVERTEBRATE	Agathymus evansi	Huachuca Giant-skipper				S				IILEP87110	S3	G2G3
Cochise	INVERTEBRATE	Agathymus neumoegeni	Neumogen's Giant Skipper								IILEP87010	S3	G4G5
Cochise	INVERTEBRATE	Anthocharis cethura	Desert Orangetip								IILEPA6010	S4	G4G5
Cochise	INVERTEBRATE	Cicindela oregona maricopa	Maricopa Tiger Beetle	SC							IICOL02362	S3	G5T3
Cochise	INVERTEBRATE	Discus shimekii	Striate Disc	SC							IMGAS54120	S2?	G5
Cochise	INVERTEBRATE	Ellipsoptera nevadica citata	Chiricahua Tiger Beetle								IICOL02175	S1	G5T3
Cochise	INVERTEBRATE	Erynnis scudderi	Scudder's Dusky Wing								IILEP37070	S1S2	G4G5
Cochise	INVERTEBRATE	Eumorsea balli	Ball's Monkey Grasshopper								IIORT14020	S1	G2G4
Cochise	INVERTEBRATE	Neophasia terlooii	Chiricahua Pine White								IILEP99020	S4	G3G4
Cochise	INVERTEBRATE	Psephenus arizonensis	Arizona Water Penny Beetle	SC							IICOL63010	S2?	G2?
Cochise	INVERTEBRATE	Pyrgulopsis bernardina	San Bernardino Springsnail	LT	S	Y					IMGASJ0950	S1	G1
Cochise	INVERTEBRATE	Pyrgulopsis thompsoni	Huachuca Springsnail	C	S		S				IMGASJ0230	S2	G2
Cochise	INVERTEBRATE	Sonorella neglecta	Portal Talussnail								IMGASC9440	SH	G1
Cochise	INVERTEBRATE	Sphingicampa raspa	A Royal Moth								IILEW0H080	S?	G1G2
Cochise	INVERTEBRATE	Stygobromus arizonensis	Arizona Cave Amphipod	SC	S						ICMAL05360	S1?	G1
Cochise	INVERTEBRATE	Sympetrum signiferum	Spot-winged Meadowhawk								IIODO61150	S2	G2G3
Cochise	MAMMAL	Antrozous pallidus	Pallid Bat								AMACC10010	S4	G5
Cochise	MAMMAL	Baiomys taylori	Northern Pygmy Mouse				S				AMAFF05010	S3	G4G5
Cochise	MAMMAL	Bat Colony									OBATCOLONY	SU	GNR
Cochise	MAMMAL	Bat Foraging Area	High Netting Concentration								OBATFORAG1	SU	GNR
Cochise	MAMMAL	Choeronycteris mexicana	Mexican Long-tongued Bat	SC	S		S		A	WSC	AMACB02010	S3	G4
Cochise	MAMMAL	Corynorhinus townsendii pallescens	Pale Townsend's Big-eared Bat	SC	S		S	4			AMACC08014	S3S4	G4T4
Cochise	MAMMAL	Didelphis virginiana californica	Mexican Opossum								AMAAA01011	S3	G5TNR
Cochise	MAMMAL	Eptesicus fuscus	Big Brown Bat								AMACC04010	S4S5	G5
Cochise	MAMMAL	Eumops perotis californicus	Greater Western Bonneted Bat	SC	S		S				AMACD02011	S3	G5T4
Cochise	MAMMAL	Idionycteris phyllotis	Allen's Lappet-browed Bat	SC	S		S				AMACC09010	S2S3	G3G4
Cochise	MAMMAL	Lasionycteris noctivagans	Silver-haired Bat						PR		AMACC02010	S3S4	G5
Cochise	MAMMAL	Lasiurus blossevillii	Western Red Bat				S			WSC	AMACC05060	S3	G5
Cochise	MAMMAL	Lasiurus cinereus	Hoary Bat	No Status							AMACC05030	S4	G5
Cochise	MAMMAL	Lasiurus xanthinus	Western Yellow Bat				S			WSC	AMACC05070	S2S3	G5
Cochise	MAMMAL	Leopardus pardalis	Ocelot	LE					P	WSC	AMAJH05010	S1	G4
Cochise	MAMMAL	Leptonycteris curasoae yerbabuenae	Lesser Long-nosed Bat	LE					|	WSC	AMACB03030	S2S3	G4
Cochise	MAMMAL	Mustela frenata	Long-tailed Weasel								AMAJF02030	S4	G5
Cochise	MAMMAL	Myotis auriculus	Southwestern Myotis								AMACC01080	S3	G5
Cochise	MAMMAL	Myotis californicus	California Myotis								AMACC01120	S4S5	G5
Cochise	MAMMAL	Myotis ciliolabrum	Western Small-footed Myotis	SC							AMACC01140	S3S4	G5
Cochise	MAMMAL	Myotis occultus	Arizona Myotis	SC	S						AMACC01160	S3	G3G4
Cochise	MAMMAL	Myotis thysanodes	Fringed Myotis	SC							AMACC01090	S3S4	G4G5
Cochise	MAMMAL	Myotis velifer	Cave Myotis	SC	S						AMACC01050	S3S4	G5
Cochise	MAMMAL	Myotis volans	Long-legged Myotis	SC							AMACC01110	S3S4	G5
Cochise	MAMMAL	Neotoma mexicana	Mexican Woodrat								AMAFF08070	S5	G5
Cochise	MAMMAL	Notiosorex cockrumi	Cockrum's Desert Shrew				S				AMABA05020	S1	GNR
Cochise	MAMMAL	Nyctinomops femorosaccus	Pocketed Free-tailed Bat				S				AMACD04010	S3	G4
Cochise	MAMMAL	Nyctinomops macrotis	Big Free-tailed Bat	SC							AMACD04020	S3	G5
Cochise	MAMMAL	Panthera onca	Jaguar	LE		P			P	WSC	AMAJH02010	S1	G3
Cochise	MAMMAL	Reithrodontomys fulvescens	Fulvous Harvest Mouse				S				AMAFF02050	S4	G5
Cochise	MAMMAL	Reithrodontomys montanus	Plains Harvest Mouse				S				AMAFF02010	S3	G5
Cochise	MAMMAL	Sciurus nayaritensis chiricahuae	Chiricahua Fox Squirrel	SC			S				AMAFB07051	S2	G5T2
Cochise	MAMMAL	Sigmodon ochrognathus	Yellow-nosed Cotton Rat	SC			S				AMAFF07040	S4	G4G5
Cochise	MAMMAL	Sorex arizonae	Arizona Shrew	SC			S		P	WSC	AMABA01240	S2	G3
Cochise	MAMMAL	Tadarida brasiliensis	Brazilian Free-tailed Bat								AMACD01010	S3S4	G5
Cochise	MAMMAL	Thomomys bottae	Botta's Pocket Gopher								AMAFC01020	S5	G5
Cochise	MAMMAL	Thomomys bottae mearnsi	Mearns' Southern Pocket Gopher	SC			PS				AMAFC0102G	S5	G5T5
Cochise	PLANT	Adiantum pedatum	American Maidenhair								PPADI030B0	S5	G5
Cochise	PLANT	Aeschynomene villosa	Sensitive Joint Vetch								PDFAB04070	S2?	G4
Cochise	PLANT	Ageratina lemmonii	Lemmon's Thorough-wort								PDASTBX0L0	S1	G3?
Cochise	PLANT	Allium plummerae	Plummer Onion							SR	PMLIL021V0	S3	G4
Cochise	PLANT	Allium rhizomatum	Redflower Onion							SR	PMLIL02320	S1	G3?Q
Cochise	PLANT	Ammocodon chenopodioides	Goosefoot Moonpod								PDNYC04010	S1	G5
Cochise	PLANT	Apacheria chiricahuensis	Chiricahua Rock Flower							SR	PDCRO01010	S2	G2

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Cochise	PLANT	Arabis tricornuta	Chiricahua Rock Cress				S				PDBRA06200	S1	G1
Cochise	PLANT	Arceuthobium blumeri	Blumer Dwarf Mistletoe								PDVIS03040	S1?	G3?
Cochise	PLANT	Asclepias lemmonii	Lemmon Milkweed				S				PDASC020Z0	S2	G4?
Cochise	PLANT	Asclepias quinquedentata	Tooth Hood Milkweed								PDASC021L0	S2	G4
Cochise	PLANT	Asplenium dalhousiae	Dalhouse Spleenwort		S						PPASP020A0	S1	GNR
Cochise	PLANT	Asplenium exiguum	Sonoran Spleenwort								PPASP020D0	S1	GU
Cochise	PLANT	Aster pauciflorus	Marsh Alkali Aster								PDASTEL010	S1	G4
Cochise	PLANT	Aster potosinus	Lemmon's Aster								PDASTE8160	S1	G2
Cochise	PLANT	Astragalus cobrensis var. maguirei	Coppermine Milk-vetch	SC			S			SR	PDFAB0F262	S1	G4T2
Cochise	PLANT	Astragalus hypoxylus	Huachuca Milkvetch	SC	S		S			SR	PDFAB0F470	S1	G1
Cochise	PLANT	Atriplex griffithsii	Griffith Saltbush								PDCHE040S0	S2S3	G2G3
Cochise	PLANT	Bouchea prismatica	Prism Bouchea								PDVER04020	S4	G4G5
Cochise	PLANT	Carex chihuahuensis	Chihuahuan Sedge				S				PMCYP032T0	S2S3	G3G4
Cochise	PLANT	Carex meadii	Mead Sedge								PMCYP03870	S3?	G4G5
Cochise	PLANT	Carex ultra	Arizona Giant Sedge		S		S				PMCYP03E50	S2	G3?
Cochise	PLANT	Castilleja lanata	White-woolly Indian-paintbrush								PDSCR0D1L0	S4	G5
Cochise	PLANT	Castilleja nervata	Trans-pecos Indian-paintbrush				S				PDSCR0D270	S1	G3Q
Cochise	PLANT	Castilleja patriotica	Tricolor Indian Paintbrush								PDSCR0D2F0	S3S4	G4
Cochise	PLANT	Centaurea rothrockii	Knap Thistle								PDAST1Y0P0	S3	G4
Cochise	PLANT	Cheilanthes arizonica	Arizona Lip Fern								PPADI09030	S2	G4
Cochise	PLANT	Cleome multicaulis	Playa Spider Plant	SC						SR	PDCPP03080	S1	G2G3
Cochise	PLANT	Coryphantha robbinsorum	Cochise Pincushion Cactus	LT						HS	PDCAC0X0C0	S1	G1
Cochise	PLANT	Coryphantha scheeri var. valida	Slender Needle Corycactus							SR	PDCAC040C4	S3?	G4T4
Cochise	PLANT	Coryphantha sneedii	Carpet Foxtail Cactus							SR	PDCAC0X0E0	S1	G2
Cochise	PLANT	Coursetia glabella	Smooth Baby-bonnets	SC			S				PDFAB140B0	S1	G3?
Cochise	PLANT	Croton fruticulosus	Encinillas								PDEUP0H0F0	S1	G5
Cochise	PLANT	Dichondra argentea	Silver Pony Foot								PDCON08010	S1	G4
Cochise	PLANT	Draba standleyi	Standley Whitlow-grass	SC							PDBRA112G0	S2S3	G2G3
Cochise	PLANT	Echinocereus ledingii	Pinaleno Hedgehog Cactus							SR	PDCAC06066	S4	G4G5T4
Cochise	PLANT	Echinocereus pseudopectinatus	Devil-thorn							SR	PDCAC060P0	S1	G4
Cochise	PLANT	Echinomastus erectocentrus var. erectocentrus	Needle-spined Pineapple Cactus	SC						SR	PDCAC0J0E2	S3	G3T3Q
Cochise	PLANT	Epithelantha micromeris	Button Cactus						PR	SR	PDCAC07020	S1	G4
Cochise	PLANT	Eragrostis obtusiflora	Alkali Lovegrass								PMPOA2K150	S3	G5
Cochise	PLANT	Erigeron arisolius	Arid Throne Fleabane				S				PDAST3M510	S2	G2
Cochise	PLANT	Erigeron arizonicus	Arizona Fleabane								PDAST3M0B0	S3	G3?
Cochise	PLANT	Erigeron kuschei	Chiricahua Fleabane	SC			S			SR	PDAST3M240	S1	G1
Cochise	PLANT	Erigeron lemmonii	Lemmon Fleabane	C						HS	PDAST3M2A0	S1	G1
Cochise	PLANT	Erigeron sceptrifer	Scepterbearing Fleabane								PDAST3M520	S1	GNR
Cochise	PLANT	Erigeron scopulinus	Winn Falls Fleabane								PDAST3M4E0	S1	G3?
Cochise	PLANT	Eriogonum capillare	San Carlos Wild-buckwheat	SC						SR	PDPGN08100	S4	G4
Cochise	PLANT	Eriogonum terrenatum	San Pedro River Wild Buckwheat		S						PDPGN08760	S1	G1
Cochise	PLANT	Eryngium lemmonii	Lemmon Button Snakeroot								PDAPI0Z0J0	S3	G4
Cochise	PLANT	Eryngium sparganophyllum	Ribbonleaf Button Snakeroot								PDAPI0Z0T0	S1	G2
Cochise	PLANT	Euphorbia macropus	Woodland Spurge	SC						SR	PDEUP0Q2U0	S2	G4
Cochise	PLANT	Euphorbia trachysperma	Roughseed Spurge								PDEUP0D2E0	S4	G4
Cochise	PLANT	Fraxinus gooddingii	Goodding Ash								PDOLE04080	S3	G3
Cochise	PLANT	Gentianella wislizeni	Wislizeni Gentian	SC			S			SR	PDGEN07090	S1	G2
Cochise	PLANT	Gentianopsis macrantha	Mexican Fringed Gentian								PDGEN08060	S1S2	G4
Cochise	PLANT	Graptopetalum bartramii	Bartram Stonecrop	SC	S		S			SR	PDCRA06010	S3	G3
Cochise	PLANT	Gutierrezia wrightii	Wright's Snakeweed								PDAST4B0C0	S2S3	G4?
Cochise	PLANT	Hedeoma costatum	Chiricahua Mock Pennyroyal								PDLAM0M0L0	S1	G5
Cochise	PLANT	Hedeoma dentatum	Mock-pennyroyal								PDLAM0M0M0	S3	G3
Cochise	PLANT	Heteranthera limosa	Mud Plantain								PMPON03030	S1	G5
Cochise	PLANT	Heterotheca rutteri	Huachuca Golden Aster	SC	S		S				PDAST4V0J0	S2	G2
Cochise	PLANT	Heuchera glomerulata	Arizona Alum Root				S				PDSAX0E0F0	S3	G3
Cochise	PLANT	Hexalectris revoluta	Chisos Coral-root				S				PMORC1C030	S1	G1G2
Cochise	PLANT	Hexalectris spicata	Crested Coralroot							SR	PMORC1C040	S3S4	G5
Cochise	PLANT	Hexalectris spicata var. arizonica	Arizona Crested coralroot				S			SR	PMORC1C041	S1S2	G5T2T4
Cochise	PLANT	Hexalectris warnockii	Texas Purple Spike	SC	S		S			HS	PMORC1C050	S1	G2G3
Cochise	PLANT	Hieracium pringlei	Pringle Hawkweed	SC							PDAST4W170	S1	G2Q
Cochise	PLANT	Hieracium rusbyi	Rusby Hawkweed				S				PDAST4W1A0	S1	G2?
Cochise	PLANT	Hymenoxys ambigens var. floribunda	A Daisy								PDAST530T2	S2	G3?T2
Cochise	PLANT	Hymenoxys quinquesquamata	Five Scale Bitterweed								PDAST530F0	S3	G3
Cochise	PLANT	Hypoxis mexicana	Yellow Star Grass								PMLIL16030	S1	G5
Cochise	PLANT	Ibervillea tenuisecta	Texas Globe Berry								PDCUC0F020	S1	G4

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Cochise	PLANT	Ipomoea plummerae var. cuneifolia	Huachuca Morning Glory								PDCON0A141	S3	G4T3
Cochise	PLANT	Ipomoea tenuiloba	Trumpet Morning-glory								PDCON0A1H0	S4	G4
Cochise	PLANT	Ipomoea thurberi	Thurber's Morning-glory								PDCON0A1K0	S1	G3
Cochise	PLANT	Justicia sonorae	Palm Canyon Justicia								PDACA0E0K0	SE	G4
Cochise	PLANT	Laennecia eriophylla	Woolly Fleabane								PDASTDL020	S2	G3
Cochise	PLANT	Leibnitzia lyrata	Woodland Sunbonnets								PDASTDM010	S4	G5
Cochise	PLANT	Lilaeopsis schaffneriana var. recurva	Huachuca Water-umbel	LE		Y				HS	PDAPI19051	S2	G4T2
Cochise	PLANT	Lilium parryi	Lemmon Lily	SC			S			SR	PMLIL1A0J0	S2	G3
Cochise	PLANT	Lithospermum viride	Green Puccoon								PDBOR0L0G0	S1	G4
Cochise	PLANT	Lobelia fenestralis	Leafy Lobelia							SR	PDCAM0E0H0	S1	G4
Cochise	PLANT	Lupinus huachucanus	Huachuca Mountain Lupine				S				PDFAB2B210	S2	G2
Cochise	PLANT	Lupinus lemmonii	Lemmon's Lupine				S				PDFAB2B2A0	S1Q	G1Q
Cochise	PLANT	Machaeranthera riparia	Chiricahua Mountain Tansy-aster								PDAST641B0	S1	G4
Cochise	PLANT	Malaxis corymbosa	Madrean Adders Mouth							SR	PMORC1R020	S3S4	G4
Cochise	PLANT	Malaxis porphyrea	Purple Adder's Mouth							SR	PMORC1R0Q0	S2	G4
Cochise	PLANT	Malaxis tenuis	Slender Adders Mouth							SR	PMORC1R090	S1	G4
Cochise	PLANT	Mammillaria viridiflora	Varied Fishhook Cactus							SR	PDCAC0A0D0	S4	G4
Cochise	PLANT	Mammillaria wrightii var. wilcoxii	Wilcox Fishhook Cactus							SR	PDCAC0A0E1	S4	G4T4
Cochise	PLANT	Mentzelia lindheimeri	Lindheimer Stickleaf								PDLOA030U0	S1	G4
Cochise	PLANT	Mentzelia oligosperma	Sparseseed Stickleaf								PDLOA03170	S1	G4
Cochise	PLANT	Metastelma mexicanum	Wiggins Milkweed Vine	SC			S				PDASC050P0	S1S2	G3G4
Cochise	PLANT	Microchloa kunthii	Kunth Grass								PMPOA40010	S1	G5
Cochise	PLANT	Muhlenbergia dubioides	Box Canyon Muhly				S				PMPOA480G0	S1	G1Q
Cochise	PLANT	Nemastylis tenuis	Slender Shell Flower								PMIRI0B040	S1	G5
Cochise	PLANT	Nissolia wislizeni	Arizona Nissolia								PDFAB2Q030	S1	G2G4
Cochise	PLANT	Notholaena aschenborniana	Aschenborn Cloak Fern								PPADI0G020	S1	G4
Cochise	PLANT	Notholaena neglecta	Neglected Cloak Fern								PPADI0G0F0	S1	G4
Cochise	PLANT	Oenothera havardii	Havard Primrose								PDONA0C0K0	S1	G4
Cochise	PLANT	Ophioglossum engelmannii	Engelmann Adders Tongue								PPOPH02040	S1	G5
Cochise	PLANT	Pectis imberbis	Beardless Chinch Weed	SC			S				PDAST6W0A0	S1	G3
Cochise	PLANT	Pediomelum pentaphyllum	Small Indian Breadroot	SC	S		S				PDFAB5L070	S1	G1
Cochise	PLANT	Pellaea ternifolia	Ternate Cliffbrake								PPADI0H0B0	S2	G5
Cochise	PLANT	Peniocereus greggii var. greggii	Night-blooming Cereus	SC					PR	SR	PDCAC0V011	S1	G3G4T2
Cochise	PLANT	Penstemon discolor	Catalina Beardtongue				S			HS	PDSCR1L210	S2	G2
Cochise	PLANT	Penstemon pinifolius	Pineleaf Beardtongue								PDSCR1L500	S3	G3G4
Cochise	PLANT	Penstemon ramosus	Branching Penstemon								PDSCR1L7L0	S1	G3G4Q
Cochise	PLANT	Penstemon stenophyllus	Narrowleaf Beardtongue								PDSCR1L5V0	S3	G4?
Cochise	PLANT	Penstemon superbus	Superb Beardtongue								PDSCR1L630	S2?	G3?
Cochise	PLANT	Perityle cochisensis	Chiricahua Rock Daisy				S			SR	PDAST70080	S1	G1
Cochise	PLANT	Phyllanthus polygonoides	Knotleaf Flower								PDEUP130E0	S2	G5
Cochise	PLANT	Physalis latiphysa	Broad-leaf Ground-cherry				S				PDSOL0S0H0	S1	G1
Cochise	PLANT	Physocarpus monogynus	Mountain Ninebark								PDROS19040	S4	G4
Cochise	PLANT	Pinaropappus roseus	Rock Lettuce								PDAST78020	S2	G5
Cochise	PLANT	Platanthera limosa	Thurber's Bog Orchid							SR	PMORC1Y0G0	S4	G4
Cochise	PLANT	Polemonium flavum	Pinaleno Jacobs Ladder								PDPLM0E0B2	S2	G5T3?
Cochise	PLANT	Polemonium pauciflorum ssp. hinckleyi	Hinckley's Ladder	SC			S				PDPLM0E0G1	S1	G3G5T2Q
Cochise	PLANT	Polygala glochidiata	Spiny Milkwort								PDPGL020J0	S2	G5
Cochise	PLANT	Psacalium decompositum	Sonoran Indian-plantain								PDASTDS010	S2	G4?
Cochise	PLANT	Psilactis gentryi	Mexican Bare-ray-aster				S				PDASTE7010	S1	G3
Cochise	PLANT	Psorothamnus scoparius	Broom Pea								PDFAB3C070	S1	G4
Cochise	PLANT	Pyrrhopappus rothrockii	False Dandelion								PDAST7V050	S3	G4
Cochise	PLANT	Ranunculus arizonicus	Arizona Buttercup								PDRAN0L0B0	S3	G4
Cochise	PLANT	Rhamnus serrata	Serrate Buckbrush								PDRHA0C0D0	S1	G4G5
Cochise	PLANT	Rumex orthoneurus	Blumer's Dock	SC			S			HS	PDPGN0P0Z0	S3	G3
Cochise	PLANT	Sagittaria montevidensis	Long-lobed Arrow-head								PMALI040K0	S1	G4G5
Cochise	PLANT	Salvia amissa	Aravaipa Sage	SC	S		S				PDLAM1S020	S2	G2
Cochise	PLANT	Samolus vagans	Chiricahua Mountain Brookweed				S				PDPRI09040	S2	G2?
Cochise	PLANT	Schiedeella arizonica	Fallen Ladies'-tresses							SR	PMORC67020	S4	GNR
Cochise	PLANT	Senecio carlomasonii	Seemann Groundsel								PDAST8H3W0	S2S3	G4?Q
Cochise	PLANT	Senecio multidentatus var. huachucanus	Huachuca Groundsel				S			HS	PDAST8H411	S2	G2G4T2
Cochise	PLANT	Senecio neomexicanus var. toumeyi	Toumey Groundsel				S				PDAST8H274	S2	G5T2Q
Cochise	PLANT	Senecio parryi	Mountain Groundsel								PDAST8H2B0	S4	G4
Cochise	PLANT	Seymeria bipinnatisecta	Sierra Madre Seymeria								PDSCR1T060	S1	G4G5
Cochise	PLANT	Sisyrinchium cernuum	Nodding Blue-eyed Grass				S				PMIRI0D0B0	S2	G5
Cochise	PLANT	Solanum heterodoxum	Melonleaf Nightshade								PDSOL0Z0X0	S4	G4G5

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Cochise	PLANT	Sophora arizonica	Arizona Necklace								PDFAB3N020	S3	G3
Cochise	PLANT	Spiranthes delitescens	Canelo Hills Ladies'-tresses	LE						HS	PMORC2B140	S1	G1
Cochise	PLANT	Stellaria porsildii	Porsild's Starwort				S				PDCAR0X160	S1	G1
Cochise	PLANT	Stenorrhynchos michuacanum	Michoacan Ladies'-tresses							SR	PMORC2B0L0	S3	G4
Cochise	PLANT	Streptanthus carinatus	Lyre-leaved Twistflower								PDBRA2G0C0	S3S4	G4
Cochise	PLANT	Talinum angustissimum	Yellow Flame Flower								PDPOR08010	S2	G4
Cochise	PLANT	Talinum marginatum	Tepic Flame Flower	SC			S			SR	PDPOR080N0	S1	G2
Cochise	PLANT	Tephrosia thurberi	Thurber Hoary Pea								PDFAB3X0M0	S3	G4G5
Cochise	PLANT	Tillandsia recurvata	Ball Moss								PMBRO090E0	S2	G5
Cochise	PLANT	Tragia amblyodonta	Tombstone Noseburn								PDEUP1D010	S1	G4
Cochise	PLANT	Tragia laciniata	Sonoran Noseburn				S				PDEUP1D060	S3?	G3G4
Cochise	PLANT	Trifolium amabile	Linda Clover								PDFAB40030	S1S2	G4
Cochise	PLANT	Tripsacum lanceolatum	Mexican Gama Grass								PMPOA68030	S2S3	G4
Cochise	PLANT	Vauquelinia californica ssp. pauciflora	Limestone Arizona Rosewood	SC						SR	PDROS1R022	S1	G4T3
Cochise	PLANT	Viola umbraticola	Shade Violet				S				PDVIO042E0	S2?	G3G4
Cochise	PLANT	Xanthisma texanum	Sleepy Daisy								PDAST9Y010	S1	G5
Cochise	PLANT	Zigadenus virescens	Green Death Camas							SR	PMLIL280E0	S4	G4
Cochise	REPTILE	Aspidoscelis arizonae	Arizona Striped Whiptail		S						ARACJ02071	S1S2	G2
Cochise	REPTILE	Aspidoscelis burti stictogrammus	Giant Spotted Whiptail	SC			S				ARACJ02011	S2	G4T4
Cochise	REPTILE	Aspidoscelis exsanguis	Chihuahuan Spotted Whiptail								ARACJ02030	S2	G5
Cochise	REPTILE	Crotalus lepidus klauberi	Banded Rock Rattlesnake						PR		ARADE02051	S3	G5T5
Cochise	REPTILE	Crotalus pricei	Twin-spotted Rattlesnake				S		PR		ARADE02080	S2	G5
Cochise	REPTILE	Crotalus willardi obscurus	New Mexico Ridge-nosed Rattlesnake	LT					PR		ARADE02131	S1	G5T1T2
Cochise	REPTILE	Crotalus willardi willardi	Arizona Ridge-nosed Rattlesnake				S		PR	WSC	ARADE02132	S1S2	G5T4
Cochise	REPTILE	Gopherus agassizii (Sonoran Population)	Sonoran Desert Tortoise	C			S		A	WSC	ARAAF01013	S4	G4T4
Cochise	REPTILE	Gyalopion canum	Chihuahuan Hook-nosed Snake								ARADB16010	S3	G5
Cochise	REPTILE	Heloderma suspectum suspectum	Reticulate Gila Monster				S		A		ARACE01012	S4	G4T4
Cochise	REPTILE	Heterodon kennerlyi	Mexican Hog-nosed Snake						PR		ARADB17012	S3	G5T4
Cochise	REPTILE	Kinosternon flavescens	Yellow Mud Turtle								ARAAE01020	S1	G5
Cochise	REPTILE	Lampropeltis getula nigrita	Western Black Kingsnake						A		ARADB19026	S3	G5T3T4Q
Cochise	REPTILE	Lampropeltis triangulum celaenops	New Mexico Milksnake						A		ARADB19052	S1	G5TNR
Cochise	REPTILE	Phrynosoma cornutum	Texas Horned Lizard	SC					A		ARACF12010	S3S4	G4G5
Cochise	REPTILE	Phrynosoma hernandesi	Greater Short-horned Lizard								ARACF12080	S4	G5
Cochise	REPTILE	Phrynosoma modestum	Round-tailed Horned Lizard								ARACF12050	S3	G5
Cochise	REPTILE	Plestiodon callicephalus	Mountain Skink				S				ARACH01030	S2	G4G5
Cochise	REPTILE	Sceloporus slevini	Slevin's Bunchgrass Lizard		S		S				ARACF14180	S2	G4
Cochise	REPTILE	Sceloporus virgatus	Striped Plateau Lizard								ARACF14150	S3	G4
Cochise	REPTILE	Senticolis triaspis intermedia	Northern Green Ratsnake				S				ARADB44011	S3	G5T4
Cochise	REPTILE	Sistrurus catenatus edwardsii	Desert Massasauga						PR	WSC	ARADE03012	S1	G3G4T3T4Q
Cochise	REPTILE	Tantilla nigriceps	Plains Black-headed Snake								ARADB35050	S2	G5
Cochise	REPTILE	Tantilla wilcoxi	Chihuahuan Black-headed Snake								ARADB35120	S1	G4
Cochise	REPTILE	Tantilla yaquia	Yaqui Black-headed Snake				S				ARADB35130	S2	G4
Cochise	REPTILE	Terrapene ornata luteola	Desert Box Turtle		S				PR		ARAAD08021	S2S3	G5T4
Cochise	REPTILE	Thamnophis eques megalops	Northern Mexican Gartersnake	C			S		A	WSC	ARADB36061	S1	G5T5
Pima	AMPHIBIAN	Anaxyrus retiformis	Sonoran Green Toad		S				PR		AAABB01140	S3	G3G4
Pima	AMPHIBIAN	Craugastor augusti cactorum	Western Barking Frog				S			WSC	AAABD04171	S2	G5T5
Pima	AMPHIBIAN	Gastrophryne olivacea	Western Narrow-mouthed Toad		S		S		PR	WSC	AAABE01020	S3	G5
Pima	AMPHIBIAN	Lithobates chiricahuensis	Chiricahua Leopard Frog	LT		Y			A	WSC	AAABH01080	S2	G3
Pima	AMPHIBIAN	Rana yavapaiensis	Lowland Leopard Frog	SC	S		S		PR	WSC	AAABH01250	S3	G4
Pima	AMPHIBIAN	Smilisca fodiens	Lowland Burrowing Treefrog		S					WSC	AAABC06010	S2	G4
Pima	BIRD	Accipiter gentilis	Northern Goshawk	SC	S		S	4	A	WSC	ABNKC12060	S3B	G5
Pima	BIRD	Ammodramus bairdii	Baird's Sparrow	SC			S			WSC	ABPBXA0010	S2N	G4
Pima	BIRD	Ammodramus savannarum ammolegus	Arizona grasshopper sparrow		S		S				ABPBXA0021	S1S2	G5TU
Pima	BIRD	Amphispiza quinquestriata	Five-striped Sparrow								ABPBX97030	S1S2	G4
Pima	BIRD	Aquila chrysaetos	Golden Eagle		S			3	P		ABNKC22010	S4	G5
Pima	BIRD	Ardea herodias	Great Blue Heron						|		ABNGA04010	S5	G5
Pima	BIRD	Asio otus	Long-eared Owl								ABNSB13010	S2B,S3S4N	G5
Pima	BIRD	Athene cunicularia hypugaea	Western Burrowing Owl	SC	S		S	4	A		ABNSB10012	S3	G4T4
Pima	BIRD	Buteo albonotatus	Zone-tailed Hawk				S				ABNKC19090	S4	G4
Pima	BIRD	Buteo lineatus	Red-shouldered Hawk								ABNKC19030	SA	G5
Pima	BIRD	Buteo nitidus maxima	Northern Gray Hawk	SC			S		PR	WSC	ABNKC19011	S3	G5T4Q
Pima	BIRD	Buteo swainsoni	Swainson's Hawk				S				ABNKC19070	S3	G5
Pima	BIRD	Buteogallus anthracinus	Common Black-Hawk				S		A	WSC	ABNKC15010	S3	G4G5
Pima	BIRD	Calamospiza melanocorys	Lark Bunting								ABPBX98010	S1B,S5N	G5
Pima	BIRD	Camptostoma imberbe	Northern Beardless-Tyrannulet				S				ABPAE04010	S4	G5

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Pima	BIRD	Caprimulgus ridgwayi	Buff-collared Nightjar				S				ABNTA07060	S2S3	G5
Pima	BIRD	Caracara cheriway	Crested Caracara	No Status						WSC	ABNKD02020	S1S2	G5
Pima	BIRD	Cathartes aura	Turkey Vulture								ABNKA02010	S5	G5
Pima	BIRD	Catharus ustulatus	Swainson's Thrush								ABPBJ18100	S1	G5
Pima	BIRD	Chloroceryle americana	Green Kingfisher								ABNXD02020	S2	G5
Pima	BIRD	Coccyzus americanus	Yellow-billed Cuckoo (Western U.S. DPS)	PS:C			S	2		WSC	ABNRB02020	S3	G5
Pima	BIRD	Colinus virginianus ridgwayi	Masked Bobwhite	LE					P	WSC	ABNLC21022	S1	G5T1
Pima	BIRD	Coragyps atratus	Black Vulture								ABNKA01010	S1S2	G5
Pima	BIRD	Dendrocygna autumnalis	Black-bellied Whistling-Duck							WSC	ABNJB01040	S3	G5
Pima	BIRD	Dendrocygna bicolor	Fulvous Whistling-Duck	SC							ABNJB01010	SAN	G5
Pima	BIRD	Empidonax fulvifrons pygmaeus	Northern Buff-breasted Flycatcher	SC			S			WSC	ABPAE33141	S1	G5T5
Pima	BIRD	Empidonax traillii extimus	Southwestern Willow Flycatcher	LE		Y		2		WSC	ABPAE33043	S1	G5T1T2
Pima	BIRD	Falco peregrinus anatum	American Peregrine Falcon	SC	S		S	4	A	WSC	ABNKD06071	S4	G4T4
Pima	BIRD	Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	SC	S		S		A	WSC	ABNSB08041	S1	G5T3
Pima	BIRD	Himantopus mexicanus	Black-necked Stilt								ABNND01010	S2	G5
Pima	BIRD	Icterus bullockii	Bullock's Oriole								ABPBXB9220	S4BS1N	G5
Pima	BIRD	Mniotilta varia	Black-and-white Warbler								ABPBX05010	S1B,S1N	G5
Pima	BIRD	Pachyramphus aglaiae	Rose-throated Becard				S			WSC	ABPAE53070	S1	G4G5
Pima	BIRD	Pandion haliaetus	Osprey							WSC	ABNKC01010	S2B,S4N	G5
Pima	BIRD	Parabuteo unicinctus	Harris's Hawk						A		ABNKC16010	S5	G5
Pima	BIRD	Peucaea carpalis	Rufous-winged Sparrow								ABPBX91080	S3	G4
Pima	BIRD	Polioptila nigriceps	Black-capped Gnatcatcher							WSC	ABPBJ08040	S1	G5
Pima	BIRD	Rallus longirostris yumanensis	Yuma Clapper Rail	LE					P	WSC	ABNME0501A	S3	G5T3
Pima	BIRD	Spinus tristis	American Goldfinch						A		ABPBY06110	S1B,S5N	G5
Pima	BIRD	Strix occidentalis lucida	Mexican Spotted Owl	LT		Y		3	A	WSC	ABNSB12012	S3S4	G3T3
Pima	BIRD	Trogon elegans	Elegant Trogon							WSC	ABNWA02070	S3	G5
Pima	BIRD	Tyrannus crassirostris	Thick-billed Kingbird				S			WSC	ABPAE52040	S2	G5
Pima	BIRD	Tyrannus melancholicus	Tropical Kingbird							WSC	ABPAE52010	S3	G5
Pima	BIRD	Zonotrichia leucophrys	White-crowned Sparrow								ABPBXA4040	S1B,S5N	G5
Pima	FISH	Agosia chrysogaster chrysogaster	Gila Longfin Dace	SC	S		S		A		AFCJB37151	S3S4	G4T3T4
Pima	FISH	Catostomus clarkii	Desert Sucker	SC	S		S				AFCJC02040	S3S4	G3G4
Pima	FISH	Cyprinodon eremus	Quitobaquito Pupfish	LE		Y				WSC	AFCNB02140	S1	G1
Pima	FISH	Cyprinodon macularius	Desert Pupfish	LE		Y			P	WSC	AFCNB02060	S1	G1
Pima	FISH	Gila intermedia	Gila Chub	LE		Y			P	WSC	AFCJB13160	S2	G2
Pima	FISH	Poeciliopsis occidentalis occidentalis	Gila Topminnow	LE					A	WSC	AFCNC05021	S1S2	G3T3
Pima	INVERTEBRATE	Abaeis nicippe	Sleepy Orange								IILEPB4110	S?	G5
Pima	INVERTEBRATE	Agathymus aryxna	Arizona Giant Skipper								IILEP87080	S5	G4G5
Pima	INVERTEBRATE	Agathymus gentryi	Gentry's Giant-skipper								IILEP87220	S?	G3G4
Pima	INVERTEBRATE	Agathymus polingi	Poling's Giant Skipper								IILEP87190	S2	G4
Pima	INVERTEBRATE	Albiorix anophthalmus	A Cave Obligate Pseudoscorpion								ILARAD4010	S?	G1G2
Pima	INVERTEBRATE	Amblyscirtes nysa	Nysa Roadside Skipper								IILEP80160	S?	G5
Pima	INVERTEBRATE	Amblyscirtes tolteca	Toltec Roadside-skipper								IILEP80110	S?	G3G4
Pima	INVERTEBRATE	Anthocharis cethura	Desert Orangetip								IILEPA6010	S4	G4G5
Pima	INVERTEBRATE	Anthocharis thoosa	Sonoran Orangetip								IILEPA6090	S5	G5
Pima	INVERTEBRATE	Apodemia palmerii	Palmer's Metalmark								IILEPH7040	S?	G5
Pima	INVERTEBRATE	Appias drusilla	Tropical White								IILEPA0010	S?	G5
Pima	INVERTEBRATE	Argia sabino	Sabino Canyon Dancer	SC			S				IIODO68100	S2	G2
Pima	INVERTEBRATE	Asterocampa leilia	Empress Leilia								IILEPM7050	S?	G5
Pima	INVERTEBRATE	Battus philenor	Pipevine Swallowtail								IILEP92010	S?	G5
Pima	INVERTEBRATE	Brephidium exilis	Western Pygmy-blue								IILEPF5010	S?	G5
Pima	INVERTEBRATE	Calephelis arizonensis	Arizona Metalmark								IILEPH2073	S2	G3G4
Pima	INVERTEBRATE	Celastrina "argiolus-ladon complex"	Azures in Part								IILEPG0090	S?	G5
Pima	INVERTEBRATE	Chlosyne californica	California Patch								IILEPJ9060	S?	G5
Pima	INVERTEBRATE	Chlosyne fulvia	Fulvia Checkerspot								IILEPJA040	S?	G5
Pima	INVERTEBRATE	Chlosyne lacinia	Bordered Patch								IILEPJ9070	S?	G5
Pima	INVERTEBRATE	Cicindela sedecimpunctata	Western Red-bellied Tiger Beetle								IICOL024F0	S5	G5
Pima	INVERTEBRATE	Cogia hippalus	Acacia Skipper								IILEP21020	S?	G5
Pima	INVERTEBRATE	Colias eurytheme	Alfalfa Sulphur								IILEPA8020	S?	G5
Pima	INVERTEBRATE	Copaeodes aurantiaca	Orange Skipperling								IILEP58010	S?	G5
Pima	INVERTEBRATE	Cylindera lemniscata	White-striped Tiger Beetle								IICOL025W0	S5	G5
Pima	INVERTEBRATE	Danaus gilippus	Queen								IILEPP2020	S?	G5
Pima	INVERTEBRATE	Danaus plexippus	Monarch						PR		IILEPP2010	S?	G5
Pima	INVERTEBRATE	Dymasia dymas	Dymas Checkerspot								IILEPK1010	S?	G5
Pima	INVERTEBRATE	Echinargus isola	Reakirt's Blue								IILEPF8030	S?	G5
Pima	INVERTEBRATE	Erynnis funeralis	Funereal Dusky Wing								IILEP37130	S?	G5

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Pima	INVERTEBRATE	Erynnis tristis	Mournful Dusky Wing								IILEP37090	S?	G5
Pima	INVERTEBRATE	Euphilotes bernardino	Bernadino Blue								IILEPG2070	S?	G3G4
Pima	INVERTEBRATE	Euptoieta claudia	Variegated Fritillary								IILEPJ5010	S?	G5
Pima	INVERTEBRATE	Eurema mexicana	Mexican Yellow								IILEPB4030	S?	G5
Pima	INVERTEBRATE	Heliopyrgus domicella	Erichson's White-skipper								IILEP39010	S?	G5
Pima	INVERTEBRATE	Hemiargus ceraunus	Ceraunus Blue								IILEPF8020	S?	G5
Pima	INVERTEBRATE	Hylephila phyleus	Fiery Skipper								IILEP61010	S?	G5
Pima	INVERTEBRATE	Junonia coenia	Buckeye								IILEPL0010	S?	G5
Pima	INVERTEBRATE	Kricogonia lyside	Lyside								IILEPB3010	S?	G5
Pima	INVERTEBRATE	Leptotes marina	Marine Blue								IILEPF6020	S?	G5
Pima	INVERTEBRATE	Lerodea arabus	Violet-clouded Skipper								IILEP81020	S?	G5
Pima	INVERTEBRATE	Lerodea eufala	Eufala Skipper								IILEP81010	S?	G5
Pima	INVERTEBRATE	Limenitis archippus obsoleta	Obsolete Viceroy Butterfly								IILEPL3024	S4	G5T3T4
Pima	INVERTEBRATE	Ministrymon leda	Leda Hairstreak								IILEPD6020	S?	G5
Pima	INVERTEBRATE	Myscelia cyananthe	Blackened Bluewing								IILEPL5040	S?	G5
Pima	INVERTEBRATE	Nathalis iole	Dainty Sulphur								IILEPB7010	S?	G5
Pima	INVERTEBRATE	Neophasia terlooii	Chiricahua Pine White								IILEP99020	S4	G3G4
Pima	INVERTEBRATE	Nymphalis antiopa	Mourning Cloak								IILEPK6030	S?	G5
Pima	INVERTEBRATE	Papilio cresphontes	Giant Swallowtail								IILEP94120	S?	G5
Pima	INVERTEBRATE	Papilio multicaudata	Two-tailed Swallowtail								IILEP94200	S?	G5
Pima	INVERTEBRATE	Papilio polyxenes	Black Swallowtail								IILEP94010	S?	G5
Pima	INVERTEBRATE	Phoebis sennae	Cloudless Sulphur								IILEPB1010	S?	G5
Pima	INVERTEBRATE	Pholisora catullus	Common Sooty Wing								IILEP41010	S?	G5
Pima	INVERTEBRATE	Pieris rapae	Cabbage Butterfly								IILEPA2030	SE	G5
Pima	INVERTEBRATE	Polygonus leo	Hammock Skipper								IILEP05010	S?	G5
Pima	INVERTEBRATE	Pyrgus albescens	Western Checkered Skipper								IILEP38060	S?	G5
Pima	INVERTEBRATE	Pyrgus philetas	Philetas Checkered Skipper								IILEP38080	S?	G5
Pima	INVERTEBRATE	Pyrisitia proterpia	Tailed Orange								IILEPB4050	S1S2B	G5
Pima	INVERTEBRATE	Sonorella eremita	San Xavier Talussnail	SC							IMGASC9240	S1	G1
Pima	INVERTEBRATE	Sonorella papagorum	Black Mountain Talussnail								IMGASC9480	S1	G1
Pima	INVERTEBRATE	Sonorella rosemontensis	Rosemont Talussnail	C							IMGASC9520	S1	G3
Pima	INVERTEBRATE	Staphylus ceos	Ceos Skipper								IILEP25010	S?	G5
Pima	INVERTEBRATE	Strymon melinus	Gray Hairstreak								IILEPF2010	S?	G5
Pima	INVERTEBRATE	Systasea zampa	Arizona Powdered Skipper								IILEP30020	S?	G5
Pima	INVERTEBRATE	Texola elada	Elada Checkerspot								IILEPK2010	S?	G5
Pima	INVERTEBRATE	Tryonia quitobaquitae	Quitobaquito Tryonia	SC							IMGASJ7130	S1	G1
Pima	INVERTEBRATE	Urbanus dorantes	Dorantes Skipper								IILEP12040	S?	G5
Pima	INVERTEBRATE	Vanessa annabella	West Coast Lady								IILEPK7030	S?	G5
Pima	INVERTEBRATE	Vanessa atalanta	Red Admiral								IILEPK7040	S?	G5
Pima	INVERTEBRATE	Vanessa cardui	Painted Lady								IILEPK7020	S?	G5
Pima	INVERTEBRATE	Vanessa virginiensis	American Painted Lady								IILEPK7010	S?	G5
Pima	INVERTEBRATE	Zerene cesonia	Southern Dogface								IILEPA9010	S?	G5
Pima	MAMMAL	Antilocapra americana sonoriensis	Sonoran Pronghorn	LE					P	WSC	AMALD01012	S1	G5T1
Pima	MAMMAL	Antrozous pallidus	Pallid Bat								AMACC10010	S4	G5
Pima	MAMMAL	Baiomys taylori	Northern Pygmy Mouse				S				AMAFF05010	S3	G4G5
Pima	MAMMAL	Bat Colony									OBATCOLONY	SU	GNR
Pima	MAMMAL	Bat Foraging Area	High Netting Concentration								OBATFORAG1	SU	GNR
Pima	MAMMAL	Chaetodipus intermedius	Rock Pocket Mouse								AMAFD05060	S5	G5
Pima	MAMMAL	Choeronycteris mexicana	Mexican Long-tongued Bat	SC	S		S		A	WSC	AMACB02010	S3	G4
Pima	MAMMAL	Corynorhinus townsendii pallescens	Pale Townsend's Big-eared Bat	SC	S		S	4			AMACC08014	S3S4	G4T4
Pima	MAMMAL	Cynomys ludovicianus	Black-tailed Prairie Dog	SC	S		S		A	WSC	AMAFB06010	SXS1	G4
Pima	MAMMAL	Didelphis virginiana californica	Mexican Opossum								AMAAA01011	S3	G5TNR
Pima	MAMMAL	Eptesicus fuscus	Big Brown Bat								AMACC04010	S4S5	G5
Pima	MAMMAL	Eumops perotis californicus	Greater Western Bonneted Bat	SC	S		S				AMACD02011	S3	G5T4
Pima	MAMMAL	Eumops underwoodi	Underwood's Bonneted Bat	SC							AMACD02020	S1	G4
Pima	MAMMAL	Lasionycteris noctivagans	Silver-haired Bat						PR		AMACC02010	S3S4	G5
Pima	MAMMAL	Lasiurus blossevillii	Western Red Bat				S			WSC	AMACC05060	S3	G5
Pima	MAMMAL	Lasiurus cinereus	Hoary Bat	No Status							AMACC05030	S4	G5
Pima	MAMMAL	Lasiurus xanthinus	Western Yellow Bat				S			WSC	AMACC05070	S2S3	G5
Pima	MAMMAL	Leptonycteris curasoae yerbabuenae	Lesser Long-nosed Bat	LE					|	WSC	AMACB03030	S2S3	G4
Pima	MAMMAL	Lepus alleni	Antelope Jackrabbit						|		AMAEB03070	S3	G5
Pima	MAMMAL	Macrotus californicus	California Leaf-nosed Bat	SC	S		S			WSC	AMACB01010	S3	G4
Pima	MAMMAL	Myotis californicus	California Myotis								AMACC01120	S4S5	G5
Pima	MAMMAL	Myotis occultus	Arizona Myotis	SC	S						AMACC01160	S3	G3G4
Pima	MAMMAL	Myotis thysanodes	Fringed Myotis	SC							AMACC01090	S3S4	G4G5

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Pima	MAMMAL	Myotis velifer	Cave Myotis	SC	S						AMACC01050	S3S4	G5
Pima	MAMMAL	Neotoma mexicana	Mexican Woodrat								AMAFF08070	S5	G5
Pima	MAMMAL	Notiosorex cockrumi	Cockrum's Desert Shrew				S				AMABA05020	S1	GNR
Pima	MAMMAL	Nyctinomops femorosaccus	Pocketed Free-tailed Bat				S				AMACD04010	S3	G4
Pima	MAMMAL	Nyctinomops macrotis	Big Free-tailed Bat	SC							AMACD04020	S3	G5
Pima	MAMMAL	Panthera onca	Jaguar	LE		P			P	WSC	AMAJH02010	S1	G3
Pima	MAMMAL	Parastrellus hesperus	Canyon Bat								AMACC03010	S5	G5
Pima	MAMMAL	Peromyscus eremicus	Cactus Mouse								AMAFF03010	S5	G5
Pima	MAMMAL	Peromyscus merriami	Merriam's Deermouse				S				AMAFF03020	S2	G5
Pima	MAMMAL	Reithrodontomys fulvescens	Fulvous Harvest Mouse				S				AMAFF02050	S4	G5
Pima	MAMMAL	Reithrodontomys montanus	Plains Harvest Mouse				S				AMAFF02010	S3	G5
Pima	MAMMAL	Sciurus arizonensis	Arizona Gray Squirrel				S		A		AMAFB07060	S4	G4
Pima	MAMMAL	Sigmodon ochrognathus	Yellow-nosed Cotton Rat	SC			S				AMAFF07040	S4	G4G5
Pima	MAMMAL	Tadarida brasiliensis	Brazilian Free-tailed Bat								AMACD01010	S3S4	G5
Pima	MAMMAL	Thomomys bottae	Botta's Pocket Gopher								AMAFC01020	S5	G5
Pima	PLANT	Abutilon parishii	Pima Indian Mallow	SC	S		S			SR	PDMAL020E0	S2	G2
Pima	PLANT	Abutilon reventum	Yellow Indian Mallow								PDMAL020J0	S2	G3G5
Pima	PLANT	Abutilon thurberi	Thurber Indian Mallow							SR	PDMAL020P0	S1	G2?
Pima	PLANT	Acacia farnesiana	Sweet Acacia								PDFAB020D0	S1S2	G5
Pima	PLANT	Agastache rupestris	Baboquivari Giant Hyssop								PDLAM030D0	S2	G3?
Pima	PLANT	Agave parviflora ssp. parviflora	Santa Cruz Striped Agave	SC			S		A	HS	PMAGA010L2	S3	G3T3
Pima	PLANT	Agave schottii var. treleasei	Trelease Agave	SC			S			HS	PMAGA010N2	S1	G5T1Q
Pima	PLANT	Allium gooddingii	Goodding Onion	SC			S	3		HS	PMLIL02120	S3S4	G4
Pima	PLANT	Allium plummerae	Plummer Onion							SR	PMLIL021V0	S3	G4
Pima	PLANT	Aloysia gratissima	Common Bee Brush								PDVER02010	S3	G5
Pima	PLANT	Amoreuxia gonzalezii	Saiya	SC			S			HS	PDBIX01010	S1	G1
Pima	PLANT	Amsonia grandiflora	Large-flowered Blue Star	SC			S				PDAPO03060	S2	G2
Pima	PLANT	Amsonia kearneyana	Kearney's Blue-star	LE						HS	PDAPO030M0	S1	G1
Pima	PLANT	Anoda abutiloides	False Indian Mallow								PDMAL07010	S2	G3
Pima	PLANT	Antirrhinum kingii	King Snapdragon								PDSCR2S040	S3	G4
Pima	PLANT	Arabis tricornuta	Chiricahua Rock Cress				S				PDBRA06200	S1	G1
Pima	PLANT	Arceuthobium apachecum	Apache Dwarf Mistletoe								PDVIS03030	S3?	G3G4
Pima	PLANT	Arceuthobium blumeri	Blumer Dwarf Mistletoe								PDVIS03040	S1?	G3?
Pima	PLANT	Asclepias lemmonii	Lemmon Milkweed				S				PDASC020Z0	S2	G4?
Pima	PLANT	Asplenium dalhousiae	Dalhouse Spleenwort		S						PPASP020A0	S1	GNR
Pima	PLANT	Aster potosinus	Lemmon's Aster								PDASTE8160	S1	G2
Pima	PLANT	Atamisquea emarginata	Desert Tree Caper								PDCPP01010	S1	G4
Pima	PLANT	Ayenia jaliscana	Ayenia				S				PDSTE010C0	S1	GNR
Pima	PLANT	Berberis harrisoniana	Kofa Mt Barberry		S						PDBER02030	S1S2	G1G2
Pima	PLANT	Boerhavia megaptera	Tucson Mountain Spiderling								PDNYC06090	S3	G3
Pima	PLANT	Capsicum annuum var. glabriusculum	Chiltepin				S				PDSOL06012	S2	G5T5
Pima	PLANT	Cardiospermum corindum	Balloon Vine								PDSPN03010	S1	G5
Pima	PLANT	Carex chihuahuensis	Chihuahuan Sedge				S				PMCYP032T0	S2S3	G3G4
Pima	PLANT	Carex ultra	Arizona Giant Sedge		S		S				PMCYP03E50	S2	G3?
Pima	PLANT	Cathestecum erectum	False Grama								PMPOA1B010	S1	G5?
Pima	PLANT	Cheilanthes pringlei	Pringle Lip Fern								PPADI090M0	S3	G4
Pima	PLANT	Corchorus hirtus	Orinico Jute								PDTIL01030	S1	G5
Pima	PLANT	Coryphantha scheeri var. robustispina	Pima Pineapple Cactus	LE						HS	PDCAC040C1	S2	G4T2
Pima	PLANT	Cylindropuntia x kelvinensis	Kelvin Cholla							SR	PDCAC0D2M0	SHYB	GNA
Pima	PLANT	Cynanchum ligulatum	Sinaloa Milkweed Vine								PDASC050V0	S1	G4
Pima	PLANT	Dalea lumholtzii	Lumholtz's Prairie-clover								PDFAB1A0Y0	S2S3	G3G4
Pima	PLANT	Dalea tentaculoides	Gentry Indigo Bush	SC	S		S			HS	PDFAB1A1K0	S1	G1
Pima	PLANT	Desmanthus covillei	Coville Bundleflower								PDFAB1C030	S1	G3G4
Pima	PLANT	Echinocactus horizonthalonius var. nicholii	Nichol Turk's Head Cactus	LE						HS	PDCAC05022	S2	G4T2
Pima	PLANT	Echinocereus fasciculatus	Magenta-flower Hedgehog-cactus							SR	PDCAC06065	S3	G4G5T4T5
Pima	PLANT	Echinomastus erectocentrus var. acunensis	Acuna Cactus	C					P	HS	PDCAC0J0E1	S1	G3T1T2Q
Pima	PLANT	Echinomastus erectocentrus var. erectocentrus	Needle-spined Pineapple Cactus	SC						SR	PDCAC0J0E2	S3	G3T3Q
Pima	PLANT	Erigeron arisolius	Arid Throne Fleabane				S				PDAST3M510	S2	G2
Pima	PLANT	Erigeron arizonicus	Arizona Fleabane								PDAST3M0B0	S3	G3?
Pima	PLANT	Erigeron lobatus	Lobed Fleabane								PDAST3M2C0	S3	G4
Pima	PLANT	Erigeron piscaticus	Fish Creek Fleabane	SC	S		S			SR	PDAST3M4X0	S1	G1
Pima	PLANT	Eriogonum capillare	San Carlos Wild-buckwheat	SC						SR	PDPGN08100	S4	G4
Pima	PLANT	Eriogonum ericifolium var. ericifolium	Heathleaf Wild-buckwheat				S				PDPGN08231	S2	G3T2
Pima	PLANT	Eriogonum terrenatum	San Pedro River Wild Buckwheat		S						PDPGN08760	S1	G1
Pima	PLANT	Eryngium sparganophyllum	Ribbonleaf Button Snakeroot								PDAPI0Z0T0	S1	G2

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Pima	PLANT	Eucnide rupestris	Flor de la Piedra								PDLOA02020	S1	G3
Pima	PLANT	Euphorbia gracillima	Mexican Broomspurge								PDEUP0D110	S3	G4?
Pima	PLANT	Ferocactus cylindraceus	Desert Barrel Cactus						PR	SR	PDCAC08080	S4	G5
Pima	PLANT	Ferocactus emoryi	Emory's Barrel-cactus							SR	PDCAC08090	S1S2	G4
Pima	PLANT	Gonolobus arizonicus	Rincon Milkweed Vine								PDASC0A020	S4	G4
Pima	PLANT	Graptopetalum bartramii	Bartram Stonecrop	SC	S		S			SR	PDCRA06010	S3	G3
Pima	PLANT	Hackelia ursina	Chihuahuan Stickseed								PDBOR0G0R0	S2	G3?
Pima	PLANT	Hedeoma dentatum	Mock-pennyroyal								PDLAM0M0M0	S3	G3
Pima	PLANT	Hermannia pauciflora	Sparseleaf Hermannia								PDSTE06010	S1	G2?
Pima	PLANT	Heterotheca rutteri	Huachuca Golden Aster	SC	S		S				PDAST4V0J0	S2	G2
Pima	PLANT	Hexalectris revoluta	Chisos Coral-root				S				PMORC1C030	S1	G1G2
Pima	PLANT	Hexalectris spicata	Crested Coralroot							SR	PMORC1C040	S3S4	G5
Pima	PLANT	Hieracium pringlei	Pringle Hawkweed	SC							PDAST4W170	S1	G2Q
Pima	PLANT	Hymenoxys quinquesquamata	Five Scale Bitterweed								PDAST530F0	S3	G3
Pima	PLANT	Ibervillea tenuisecta	Texas Globe Berry								PDCUC0F020	S1	G4
Pima	PLANT	Ipomoea tenuiloba	Trumpet Morning-glory								PDCON0A1H0	S4	G4
Pima	PLANT	Jacquemontia pringlei	Pringle's Cluster-vine								PDCON0B080	S2S3	G5
Pima	PLANT	Jatropha cinerea	Sangre de Drago								PDEUP0X030	S1	G5
Pima	PLANT	Justicia candicans	Hierba Azul								PDACA0E0L0	S2	G4
Pima	PLANT	Lagascea decipiens	Beguiling Mexican Daisy								PDAST5G010	S4	G5
Pima	PLANT	Lilaeopsis schaffneriana var. recurva	Huachuca Water-umbel	LE		Y				HS	PDAPI19051	S2	G4T2
Pima	PLANT	Lilium parryi	Lemmon Lily	SC			S			SR	PMLIL1A0J0	S2	G3
Pima	PLANT	Listera convallarioides	Broadleaf Twayblade							SR	PMORC1N050	S1	G5
Pima	PLANT	Lophocereus schottii	Senita						|	SR	PDCAC14010	S1S2	G4
Pima	PLANT	Lupinus huachucanus	Huachuca Mountain Lupine				S				PDFAB2B210	S2	G2
Pima	PLANT	Lupinus lemmonii	Lemmon's Lupine				S				PDFAB2B2A0	S1Q	G1Q
Pima	PLANT	Lysiloma watsonii	Littleleaf False Tamarind							SR	PDFAB2C040	S1	G4?
Pima	PLANT	Machaeranthera arida	Arid Tansy-aster								PDAST64040	S1	G3G4
Pima	PLANT	Malaxis tenuis	Slender Adders Mouth							SR	PMORC1R090	S1	G4
Pima	PLANT	Malvastrum bicuspidatum	Mexican Shrub Mallow								PDMAL0S030	S2	G4
Pima	PLANT	Mammillaria mainiae	Counter Clockwise Fishhook Cactus				S			SR	PDCAC0A060	S1	G3
Pima	PLANT	Mammillaria thornberi	Thornber Fishhook Cactus							SR	PDCAC0A0C0	S4	G4
Pima	PLANT	Mammillaria viridiflora	Varied Fishhook Cactus							SR	PDCAC0A0D0	S4	G4
Pima	PLANT	Manihot davisiae	Arizona Manihot				S				PDEUP0Z010	S2	G4
Pima	PLANT	Matelea cordifolia	Sonoran Milkweed Vine								PDASC0A080	S1	G4
Pima	PLANT	Metastelma mexicanum	Wiggins Milkweed Vine	SC			S				PDASC050P0	S1S2	G3G4
Pima	PLANT	Microchloa kunthii	Kunth Grass								PMPOA40010	S1	G5
Pima	PLANT	Mimosa distachya var. laxiflora	Garabatillo								PDFAB2K070	S2	G5
Pima	PLANT	Muhlenbergia dubioides	Box Canyon Muhly				S				PMPOA480G0	S1	G1Q
Pima	PLANT	Muhlenbergia xerophila	Weeping Muhly				S				PMPOA48220	S1	G3
Pima	PLANT	Notholaena lemmonii	Lemmon Cloak Fern	SC							PPADI0G0D0	S1S2	G3?
Pima	PLANT	Opuntia engelmannii									PDCAC0D220	S3?	G5
Pima	PLANT	Opuntia engelmannii var. flavispina								SR	PDCAC0D224	S3?	G5T3?
Pima	PLANT	Opuntia versicolor	Stag-horn Cholla							SR	PDCAC0D1K0	S2S3	G4
Pima	PLANT	Passiflora arizonica	Arizona Passionflower				S				PDPAS01073	S2	G5T3T5
Pima	PLANT	Pectis imberbis	Beardless Chinch Weed	SC			S				PDAST6W0A0	S1	G3
Pima	PLANT	Pellaea wrightiana	Wright Cliff Brake								PPADI0H0E0	S3S4	G5
Pima	PLANT	Peniocereus greggii var. transmontanus	Desert Night-blooming Cereus						PR	SR	PDCAC0V012	S3S4	G3G4T3T4
Pima	PLANT	Peniocereus striatus	Dahlia Rooted Cereus							SR	PDCAC0V020	S1	G4
Pima	PLANT	Penstemon discolor	Catalina Beardtongue				S			HS	PDSCR1L210	S2	G2
Pima	PLANT	Penstemon superbus	Superb Beardtongue								PDSCR1L630	S2?	G3?
Pima	PLANT	Perityle ajoensis	Ajo Rock Daisy							SR	PDAST700Y0	S1	G1
Pima	PLANT	Petalonyx linearis	Longleaf Sandpaper Plant								PDLOA04010	S2	G4
Pima	PLANT	Physalis latiphysa	Broad-leaf Ground-cherry				S				PDSOL0S0H0	S1	G1
Pima	PLANT	Plagiobothrys pringlei	Pringle Popcorn-flower								PDBOR0V0V0	S2	G3G4
Pima	PLANT	Platanthera limosa	Thurber's Bog Orchid							SR	PMORC1Y0G0	S4	G4
Pima	PLANT	Polygonum fusiforme	Needles Knotweed								PDPGN0L110	S3?	G3G4Q
Pima	PLANT	Polypogon elongatus	American Rabbitfoot Grass								PMPOA50020	S1	G5
Pima	PLANT	Proboscidea parviflora	Small-flower Unicorn-plant								PDPED06040	S4	G4G5
Pima	PLANT	Psilotum nudum	Whisk Fern				S			HS	PPPSI01020	S1	G5
Pima	PLANT	Pyrrhopappus rothrockii	False Dandelion								PDAST7V050	S3	G4
Pima	PLANT	Salvia columbariae	California Sage								PDLAM1S0D0	S4S5	G5
Pima	PLANT	Samolus vagans	Chiricahua Mountain Brookweed				S				PDPRI09040	S2	G2?
Pima	PLANT	Schiedeella arizonica	Fallen Ladies'-tresses							SR	PMORC67020	S4	GNR
Pima	PLANT	Selaginella eremophila	Desert Spike Moss								PPSEL010G0	S3S4	G4

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Pima	PLANT	Senecio carlomasonii	Seemann Groundsel								PDAST8H3W0	S2S3	G4?Q
Pima	PLANT	Senecio neomexicanus var. toumeyi	Toumey Groundsel				S				PDAST8H274	S2	G5T2Q
Pima	PLANT	Senecio parryi	Mountain Groundsel								PDAST8H2B0	S4	G4
Pima	PLANT	Sisyrinchium cernuum	Nodding Blue-eyed Grass				S				PMIRI0D0B0	S2	G5
Pima	PLANT	Solanum lumholtzianum	Lumholtz Nightshade								PDSOL0Z180	S3	G3G4
Pima	PLANT	Sophora arizonica	Arizona Necklace								PDFAB3N020	S3	G3
Pima	PLANT	Stenocereus thurberi	Organ Pipe Cactus							SR	PDCAC10020	S4	G5
Pima	PLANT	Stevia lemmonii	Lemmon's Stevia				S				PDAST8V010	S2	G3G4
Pima	PLANT	Streptanthus carinatus	Lyre-leaved Twistflower								PDBRA2G0C0	S3S4	G4
Pima	PLANT	Talinum angustissimum	Yellow Flame Flower								PDPOR08010	S2	G4
Pima	PLANT	Tephrosia thurberi	Thurber Hoary Pea								PDFAB3X0M0	S3	G4G5
Pima	PLANT	Thalictrum dasycarpum	Purple Meadow Rue								PDRAN0M060	S2	G5
Pima	PLANT	Thelypteris puberula var. sonorensis	Aravaipa Woodfern		S		S				PPTHE05192	S2	G5T3
Pima	PLANT	Tithonia thurberi	Thurber Tithonia								PDAST9A030	S4	G4
Pima	PLANT	Tragia laciniata	Sonoran Noseburn				S				PDEUP1D060	S3?	G3G4
Pima	PLANT	Triteleiopsis palmeri	Blue Sand Lily		S					SR	PMLIL22010	S1	G3
Pima	PLANT	Tumamoca macdougalii	Tumamoc Globeberry		S		S			SR	PDCUC0S010	S3	G4
Pima	PLANT	Vauquelinia californica ssp. sonorensis	Arizona Sonoran Rosewood		S						PDROS1R024	S1	G4T1
Pima	PLANT	Verbena pinetorum	Chihuahua Vervain								PDVER0N0P0	S1	G2G4
Pima	PLANT	Viola umbraticola	Shade Violet				S				PDVIO042E0	S2?	G3G4
Pima	PLANT	Ziziphus obtusifolia	Lotebush								PDRHA0E030	S3S4	G4G5
Pima	REPTILE	Aspidoscelis arizonae	Arizona Striped Whiptail		S						ARACJ02071	S1S2	G2
Pima	REPTILE	Aspidoscelis burti stictogrammus	Giant Spotted Whiptail	SC			S				ARACJ02011	S2	G4T4
Pima	REPTILE	Aspidoscelis xanthonota	Redback Whiptail	SC							ARACJ02012	S2	G4T2
Pima	REPTILE	Chionactis occipitalis klauberi	Tucson Shovel-nosed Snake	C		P					ARADB05012	S1	G5T3Q
Pima	REPTILE	Chionactis palarostris organica	Organ Pipe Shovel-nosed Snake								ARADB05021	S1	G3G4T2
Pima	REPTILE	Coluber bilineatus	Sonoran Whipsnake								ARADB21010	S5	G5
Pima	REPTILE	Crotalus lepidus klauberi	Banded Rock Rattlesnake						PR		ARADE02051	S3	G5T5
Pima	REPTILE	Crotaphytus nebrius	Sonoran Collared Lizard								ARACF04050	S3S4	G4
Pima	REPTILE	Gopherus agassizii (Sonoran Population)	Sonoran Desert Tortoise	C			S		A	WSC	ARAAF01013	S4	G4T4
Pima	REPTILE	Gyalopion canum	Chihuahuan Hook-nosed Snake								ARADB16010	S3	G5
Pima	REPTILE	Heloderma suspectum	Gila Monster						A		ARACE01010	S4	G4
Pima	REPTILE	Heloderma suspectum suspectum	Reticulate Gila Monster				S		A		ARACE01012	S4	G4T4
Pima	REPTILE	Heterodon kennerlyi	Mexican Hog-nosed Snake						PR		ARADB17012	S3	G5T4
Pima	REPTILE	Kinosternon arizonense	Arizona Mud Turtle								ARAAE01060	S2	G4
Pima	REPTILE	Kinosternon sonoriense longifemorale	Sonoyta Mud Turtle	C							ARAAE01041	S1	G4T1
Pima	REPTILE	Lampropeltis getula nigrita	Western Black Kingsnake						A		ARADB19026	S3	G5T3T4Q
Pima	REPTILE	Lichanura trivirgata trivirgata	Mexican Rosy Boa	SC							ARADA01023	S1S2	G4G5T3
Pima	REPTILE	Oxybelis aeneus	Brown Vinesnake				S			WSC	ARADB24010	S1	G5
Pima	REPTILE	Phrynosoma cornutum	Texas Horned Lizard	SC					A		ARACF12010	S3S4	G4G5
Pima	REPTILE	Phrynosoma hernandesi	Greater Short-horned Lizard								ARACF12080	S4	G5
Pima	REPTILE	Phyllorhynchus browni	Saddled Leaf-nosed Snake				PS		PR		ARADB25010	S5	G5
Pima	REPTILE	Plestiodon callicephalus	Mountain Skink				S				ARACH01030	S2	G4G5
Pima	REPTILE	Sceloporus slevini	Slevin's Bunchgrass Lizard		S		S				ARACF14180	S2	G4
Pima	REPTILE	Senticolis triaspis intermedia	Northern Green Ratsnake				S				ARADB44011	S3	G5T4
Pima	REPTILE	Tantilla nigriceps	Plains Black-headed Snake								ARADB35050	S2	G5
Pima	REPTILE	Tantilla wilcoxi	Chihuahuan Black-headed Snake								ARADB35120	S1	G4
Pima	REPTILE	Terrapene ornata luteola	Desert Box Turtle		S				PR		ARAAD08021	S2S3	G5T4
Pima	REPTILE	Thamnophis eques megalops	Northern Mexican Gartersnake	C			S		A	WSC	ARADB36061	S1	G5T5
Pima	REPTILE	Uma rufopunctata	Yuman Desert Fringe-toed Lizard	SC	S				A	WSC	ARACF15040	S2	G3
Santa Cruz	AMPHIBIAN	Ambystoma mavortium stebbinsi	Sonora Tiger Salamander	LE					PR	WSC	AAAAA01145	S1	G5T1T2
Santa Cruz	AMPHIBIAN	Craugastor augusti cactorum	Western Barking Frog				S			WSC	AAABD04171	S2	G5T5
Santa Cruz	AMPHIBIAN	Gastrophryne olivacea	Western Narrow-mouthed Toad		S		S		PR	WSC	AAABE01020	S3	G5
Santa Cruz	AMPHIBIAN	Hyla wrightorum (Huachuca/Canelo Pop.)	Arizona Treefrog (Huachuca/Canelo DPS)	C,DPS							AAABC02082	S1	G4T2
Santa Cruz	AMPHIBIAN	Lithobates chiricahuensis	Chiricahua Leopard Frog	LT		Y			A	WSC	AAABH01080	S2	G3
Santa Cruz	AMPHIBIAN	Rana tarahumarae	Tarahumara Frog	SC			S			WSC	AAABH01210	SXS1	G3
Santa Cruz	AMPHIBIAN	Rana yavapaiensis	Lowland Leopard Frog	SC	S		S		PR	WSC	AAABH01250	S3	G4
Santa Cruz	BIRD	Accipiter gentilis	Northern Goshawk	SC	S		S	4	A	WSC	ABNKC12060	S3B	G5
Santa Cruz	BIRD	Amazilia beryllina	Berylline Hummingbird								ABNUC29080	S1	G4
Santa Cruz	BIRD	Amazilia violiceps	Violet-crowned Hummingbird				S			WSC	ABNUC29150	S3	G5
Santa Cruz	BIRD	Ammodramus bairdii	Baird's Sparrow	SC			S			WSC	ABPBXA0010	S2N	G4
Santa Cruz	BIRD	Ammodramus savannarum ammolegus	Arizona grasshopper sparrow		S		S				ABPBXA0021	S1S2	G5TU
Santa Cruz	BIRD	Amphispiza quinquestriata	Five-striped Sparrow								ABPBX97030	S1S2	G4
Santa Cruz	BIRD	Anthus spragueii	Sprague's Pipit	C						WSC	ABPBM02060	S2N	G4
Santa Cruz	BIRD	Aquila chrysaetos	Golden Eagle		S			3	P		ABNKC22010	S4	G5

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Santa Cruz	BIRD	Athene cunicularia hypugaea	Western Burrowing Owl	SC	S		S	4	A		ABNSB10012	S3	G4T4
Santa Cruz	BIRD	Buteo albonotatus	Zone-tailed Hawk				S				ABNKC19090	S4	G4
Santa Cruz	BIRD	Buteo nitidus maxima	Northern Gray Hawk	SC			S		PR	WSC	ABNKC19011	S3	G5T4Q
Santa Cruz	BIRD	Buteogallus anthracinus	Common Black-Hawk				S		A	WSC	ABNKC15010	S3	G4G5
Santa Cruz	BIRD	Calothorax lucifer	Lucifer Hummingbird				S				ABNUC44010	S2	G4G5
Santa Cruz	BIRD	Camptostoma imberbe	Northern Beardless-Tyrannulet				S				ABPAE04010	S4	G5
Santa Cruz	BIRD	Caprimulgus ridgwayi	Buff-collared Nightjar				S				ABNTA07060	S2S3	G5
Santa Cruz	BIRD	Catharus ustulatus	Swainson's Thrush								ABPBJ18100	S1	G5
Santa Cruz	BIRD	Chloroceryle americana	Green Kingfisher								ABNXD02020	S2	G5
Santa Cruz	BIRD	Coccyzus americanus	Yellow-billed Cuckoo (Western U.S. DPS)	PS:C			S	2		WSC	ABNRB02020	S3	G5
Santa Cruz	BIRD	Dendrocygna autumnalis	Black-bellied Whistling-Duck							WSC	ABNJB01040	S3	G5
Santa Cruz	BIRD	Empidonax fulvifrons pygmaeus	Northern Buff-breasted Flycatcher	SC			S			WSC	ABPAE33141	S1	G5T5
Santa Cruz	BIRD	Empidonax traillii extimus	Southwestern Willow Flycatcher	LE		Y		2		WSC	ABPAE33043	S1	G5T1T2
Santa Cruz	BIRD	Falco peregrinus anatum	American Peregrine Falcon	SC	S		S	4	A	WSC	ABNKD06071	S4	G4T4
Santa Cruz	BIRD	Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	SC	S		S		A	WSC	ABNSB08041	S1	G5T3
Santa Cruz	BIRD	Haliaeetus leucocephalus (wintering pop.)	Bald Eagle - Winter Population	SC	S		S	2	P	WSC	ABNKC10015	S4N	G5TNR
Santa Cruz	BIRD	Icterus bullockii	Bullock's Oriole								ABPBXB9220	S4BS1N	G5
Santa Cruz	BIRD	Lampornis clemenciae	Blue-throated Hummingbird								ABNUC34040	S4	G5
Santa Cruz	BIRD	Pachyramphus aglaiae	Rose-throated Becard				S			WSC	ABPAE53070	S1	G4G5
Santa Cruz	BIRD	Pandion haliaetus	Osprey							WSC	ABNKC01010	S2B,S4N	G5
Santa Cruz	BIRD	Polioptila nigriceps	Black-capped Gnatcatcher							WSC	ABPBJ08040	S1	G5
Santa Cruz	BIRD	Sialia sialis fulva	Azure Bluebird								ABPBJ15012	S3	G5TU
Santa Cruz	BIRD	Strix occidentalis lucida	Mexican Spotted Owl	LT		Y		3	A	WSC	ABNSB12012	S3S4	G3T3
Santa Cruz	BIRD	Tachybaptus dominicus	Least Grebe								ABNCA01010	SAB	G5
Santa Cruz	BIRD	Trogon elegans	Elegant Trogon							WSC	ABNWA02070	S3	G5
Santa Cruz	BIRD	Tyrannus crassirostris	Thick-billed Kingbird				S			WSC	ABPAE52040	S2	G5
Santa Cruz	BIRD	Tyrannus melancholicus	Tropical Kingbird							WSC	ABPAE52010	S3	G5
Santa Cruz	FISH	Agosia chrysogaster chrysogaster	Gila Longfin Dace	SC	S		S		A		AFCJB37151	S3S4	G4T3T4
Santa Cruz	FISH	Catostomus clarkii	Desert Sucker	SC	S		S				AFCJC02040	S3S4	G3G4
Santa Cruz	FISH	Catostomus insignis	Sonora Sucker	SC	S		S		P		AFCJC02100	S3	G3
Santa Cruz	FISH	Cyprinodon macularius	Desert Pupfish	LE		Y			P	WSC	AFCNB02060	S1	G1
Santa Cruz	FISH	Gila ditaenia	Sonora Chub	LT		Y			A	WSC	AFCJB13090	S1	G2
Santa Cruz	FISH	Gila intermedia	Gila Chub	LE		Y			P	WSC	AFCJB13160	S2	G2
Santa Cruz	FISH	Poeciliopsis occidentalis occidentalis	Gila Topminnow	LE					A	WSC	AFCNC05021	S1S2	G3T3
Santa Cruz	FISH	Rhinichthys osculus	Speckled Dace	SC	S				P		AFCJB37050	S3S4	G5
Santa Cruz	INVERTEBRATE	Agathymus aryxna	Arizona Giant Skipper								IILEP87080	S5	G4G5
Santa Cruz	INVERTEBRATE	Amblyscirtes aenus	Bronze Roadside Skipper								IILEP80040	S?	G5
Santa Cruz	INVERTEBRATE	Amblyscirtes elissa	Elissa Roadside-skipper								IILEP80240	S?	G3G4
Santa Cruz	INVERTEBRATE	Amblyscirtes nysa	Nysa Roadside Skipper								IILEP80160	S?	G5
Santa Cruz	INVERTEBRATE	Amblyscirtes oslari	Oslar's Roadside Skipper								IILEP80060	S?	G4
Santa Cruz	INVERTEBRATE	Argia sabino	Sabino Canyon Dancer	SC			S				IIODO68100	S2	G2
Santa Cruz	INVERTEBRATE	Calephelis arizonensis	Arizona Metalmark								IILEPH2073	S2	G3G4
Santa Cruz	INVERTEBRATE	Heterelmis stephani	Stephan's Heterelmis Riffle Beetle	C			S				IICOL5B010	S1	G1
Santa Cruz	INVERTEBRATE	Limenitis archippus obsoleta	Obsolete Viceroy Butterfly								IILEPL3024	S4	G5T3T4
Santa Cruz	INVERTEBRATE	Neophasia terlooii	Chiricahua Pine White								IILEP99020	S4	G3G4
Santa Cruz	INVERTEBRATE	Pyrgulopsis thompsoni	Huachuca Springsnail	C	S		S				IMGASJ0230	S2	G2
Santa Cruz	INVERTEBRATE	Stygobromus arizonensis	Arizona Cave Amphipod	SC	S						ICMAL05360	S1?	G1
Santa Cruz	INVERTEBRATE	Sympetrum signiferum	Spot-winged Meadowhawk								IIODO61150	S2	G2G3
Santa Cruz	INVERTEBRATE	Thorybes pylades	Northern Cloudy Wing								IILEP16020	S?	G5
Santa Cruz	INVERTEBRATE	Tuberochernes ubicki	A Cave Obligate Pseudoscorpion								ILARAD3020	S?	G1G2
Santa Cruz	MAMMAL	Antrozous pallidus	Pallid Bat								AMACC10010	S4	G5
Santa Cruz	MAMMAL	Baiomys taylori	Northern Pygmy Mouse				S				AMAFF05010	S3	G4G5
Santa Cruz	MAMMAL	Bat Colony									OBATCOLONY	SU	GNR
Santa Cruz	MAMMAL	Bat Foraging Area	High Netting Concentration								OBATFORAG1	SU	GNR
Santa Cruz	MAMMAL	Choeronycteris mexicana	Mexican Long-tongued Bat	SC	S		S		A	WSC	AMACB02010	S3	G4
Santa Cruz	MAMMAL	Conepatus leuconotus leuconotus	Hog-nosed Skunk								AMAJF07022	S3	G4T4
Santa Cruz	MAMMAL	Corynorhinus townsendii pallescens	Pale Townsend's Big-eared Bat	SC	S		S	4			AMACC08014	S3S4	G4T4
Santa Cruz	MAMMAL	Didelphis virginiana californica	Mexican Opossum								AMAAA01011	S3	G5TNR
Santa Cruz	MAMMAL	Lasiurus blossevillii	Western Red Bat				S			WSC	AMACC05060	S3	G5
Santa Cruz	MAMMAL	Lasiurus cinereus	Hoary Bat	No Status							AMACC05030	S4	G5
Santa Cruz	MAMMAL	Leptonycteris curasoae yerbabuenae	Lesser Long-nosed Bat	LE					|	WSC	AMACB03030	S2S3	G4
Santa Cruz	MAMMAL	Macrotus californicus	California Leaf-nosed Bat	SC	S		S			WSC	AMACB01010	S3	G4
Santa Cruz	MAMMAL	Mormoops megalophylla	Ghost-faced Bat								AMACA01010	SA	G4
Santa Cruz	MAMMAL	Myotis velifer	Cave Myotis	SC	S						AMACC01050	S3S4	G5
Santa Cruz	MAMMAL	Panthera onca	Jaguar	LE		P			P	WSC	AMAJH02010	S1	G3

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Santa Cruz	MAMMAL	Reithrodontomys fulvescens	Fulvous Harvest Mouse				S				AMAFF02050	S4	G5
Santa Cruz	MAMMAL	Reithrodontomys montanus	Plains Harvest Mouse				S				AMAFF02010	S3	G5
Santa Cruz	MAMMAL	Sciurus arizonensis	Arizona Gray Squirrel				S		A		AMAFB07060	S4	G4
Santa Cruz	MAMMAL	Sigmodon ochrognathus	Yellow-nosed Cotton Rat	SC			S				AMAFF07040	S4	G4G5
Santa Cruz	MAMMAL	Sorex arizonae	Arizona Shrew	SC			S		P	WSC	AMABA01240	S2	G3
Santa Cruz	MAMMAL	Tadarida brasiliensis	Brazilian Free-tailed Bat								AMACD01010	S3S4	G5
Santa Cruz	MAMMAL	Thomomys bottae	Botta's Pocket Gopher								AMAFC01020	S5	G5
Santa Cruz	MAMMAL	Thomomys umbrinus intermedius	Southern Pocket Gopher				S				AMAFC01012	S3	G5T3
Santa Cruz	PLANT	Abutilon parishii	Pima Indian Mallow	SC	S		S			SR	PDMAL020E0	S2	G2
Santa Cruz	PLANT	Abutilon reventum	Yellow Indian Mallow								PDMAL020J0	S2	G3G5
Santa Cruz	PLANT	Acacia farnesiana	Sweet Acacia								PDFAB020D0	S1S2	G5
Santa Cruz	PLANT	Aeschynomene villosa	Sensitive Joint Vetch								PDFAB04070	S2?	G4
Santa Cruz	PLANT	Agastache pallida	Barber Giant Hyssop								PDLAM03090	S1?	G4?
Santa Cruz	PLANT	Agastache rupestris	Baboquivari Giant Hyssop								PDLAM030D0	S2	G3?
Santa Cruz	PLANT	Agave parviflora ssp. parviflora	Santa Cruz Striped Agave	SC			S		A	HS	PMAGA010L2	S3	G3T3
Santa Cruz	PLANT	Allium rhizomatum	Redflower Onion							SR	PMLIL02320	S1	G3?Q
Santa Cruz	PLANT	Aloysia gratissima	Common Bee Brush								PDVER02010	S3	G5
Santa Cruz	PLANT	Amoreuxia gonzalezii	Saiya	SC			S			HS	PDBIX01010	S1	G1
Santa Cruz	PLANT	Amsonia grandiflora	Large-flowered Blue Star	SC			S				PDAPO03060	S2	G2
Santa Cruz	PLANT	Anoda abutiloides	False Indian Mallow								PDMAL07010	S2	G3
Santa Cruz	PLANT	Arabis tricornuta	Chiricahua Rock Cress				S				PDBRA06200	S1	G1
Santa Cruz	PLANT	Argyrochosma incana	Hoary Cloak Fern								PPADI0N030	S2	G5
Santa Cruz	PLANT	Asclepias incarnata ssp. incarnata	Purple Milkweed								PDASC020U1	S1	G5T5
Santa Cruz	PLANT	Asclepias lemmonii	Lemmon Milkweed				S				PDASC020Z0	S2	G4?
Santa Cruz	PLANT	Asclepias uncialis	Greene Milkweed	SC			S				PDASC02220	S1?	G3G4
Santa Cruz	PLANT	Asplenium exiguum	Sonoran Spleenwort								PPASP020D0	S1	GU
Santa Cruz	PLANT	Aster pauciflorus	Marsh Alkali Aster								PDASTEL010	S1	G4
Santa Cruz	PLANT	Aster potosinus	Lemmon's Aster								PDASTE8160	S1	G2
Santa Cruz	PLANT	Astragalus hypoxylus	Huachuca Milkvetch	SC	S		S			SR	PDFAB0F470	S1	G1
Santa Cruz	PLANT	Ayenia glabra	See: Ayenia jaliscana								PDSTE01090	SRF	G4
Santa Cruz	PLANT	Bouchea prismatica	Prism Bouchea								PDVER04020	S4	G4G5
Santa Cruz	PLANT	Browallia eludens	Bush-violet	SC			S				PDSOL03030	S1	G2?
Santa Cruz	PLANT	Capsicum annuum var. glabriusculum	Chiltepin				S				PDSOL06012	S2	G5T5
Santa Cruz	PLANT	Carex chihuahuensis	Chihuahuan Sedge				S				PMCYP032T0	S2S3	G3G4
Santa Cruz	PLANT	Carex ultra	Arizona Giant Sedge		S		S				PMCYP03E50	S2	G3?
Santa Cruz	PLANT	Centaurea rothrockii	Knap Thistle								PDAST1Y0P0	S3	G4
Santa Cruz	PLANT	Choisya mollis	Santa Cruz Star Leaf	SC			S				PDRUT02022	S2	G5?T2?
Santa Cruz	PLANT	Conioselinum mexicanum	Mexican Hemlock Parsley	SC			S				PDAPI0P030	S1	G2?
Santa Cruz	PLANT	Corchorus hirtus	Orinico Jute								PDTIL01030	S1	G5
Santa Cruz	PLANT	Coryphantha recurvata	Santa Cruz Beehive Cactus				S			HS	PDCAC04090	S3	G3
Santa Cruz	PLANT	Coryphantha scheeri var. robustispina	Pima Pineapple Cactus	LE						HS	PDCAC040C1	S2	G4T2
Santa Cruz	PLANT	Coursetia glabella	Smooth Baby-bonnets	SC			S				PDFAB140B0	S1	G3?
Santa Cruz	PLANT	Croton ciliatoglandulifer	Tropical Glandular Croton								PDEUP0H070	S1	G5
Santa Cruz	PLANT	Cynanchum ligulatum	Sinaloa Milkweed Vine								PDASC050V0	S1	G4
Santa Cruz	PLANT	Dalea lumholtzii	Lumholtz's Prairie-clover								PDFAB1A0Y0	S2S3	G3G4
Santa Cruz	PLANT	Dalea tentaculoides	Gentry Indigo Bush	SC	S		S			HS	PDFAB1A1K0	S1	G1
Santa Cruz	PLANT	Desmanthus bicornutus	Ruby Bundleflower								PDFAB1C0A0	S1	G4
Santa Cruz	PLANT	Dichondra repens var. sericea	Silky Pony Foot								PDCON08090	S1	G5
Santa Cruz	PLANT	Erigeron arisolius	Arid Throne Fleabane				S				PDAST3M510	S2	G2
Santa Cruz	PLANT	Erigeron arizonicus	Arizona Fleabane								PDAST3M0B0	S3	G3?
Santa Cruz	PLANT	Erigeron pringlei	Pringle's Fleabane								PDAST3M3C0	S2	G2
Santa Cruz	PLANT	Erigeron sceptrifer	Scepterbearing Fleabane								PDAST3M520	S1	GNR
Santa Cruz	PLANT	Euphorbia macropus	Woodland Spurge	SC						SR	PDEUP0Q2U0	S2	G4
Santa Cruz	PLANT	Fraxinus gooddingii	Goodding Ash								PDOLE04080	S3	G3
Santa Cruz	PLANT	Gentianopsis macrantha	Mexican Fringed Gentian								PDGEN08060	S1S2	G4
Santa Cruz	PLANT	Gonolobus arizonicus	Rincon Milkweed Vine								PDASC0A020	S4	G4
Santa Cruz	PLANT	Graptopetalum bartramii	Bartram Stonecrop	SC	S		S			SR	PDCRA06010	S3	G3
Santa Cruz	PLANT	Gutierrezia wrightii	Wright's Snakeweed								PDAST4B0C0	S2S3	G4?
Santa Cruz	PLANT	Hedeoma dentatum	Mock-pennyroyal								PDLAM0M0M0	S3	G3
Santa Cruz	PLANT	Henrya insularis	Henrya								PDACA0R010	S1	G5
Santa Cruz	PLANT	Heteranthera limosa	Mud Plantain								PMPON03030	S1	G5
Santa Cruz	PLANT	Heterotheca rutteri	Huachuca Golden Aster	SC	S		S				PDAST4V0J0	S2	G2
Santa Cruz	PLANT	Hexalectris revoluta	Chisos Coral-root				S				PMORC1C030	S1	G1G2
Santa Cruz	PLANT	Hexalectris spicata	Crested Coralroot							SR	PMORC1C040	S3S4	G5
Santa Cruz	PLANT	Hexalectris spicata var. arizonica	Arizona Crested coralroot				S			SR	PMORC1C041	S1S2	G5T2T4

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Santa Cruz	PLANT	Hieracium pringlei	Pringle Hawkweed	SC							PDAST4W170	S1	G2Q
Santa Cruz	PLANT	Ipomoea plummerae var. cuneifolia	Huachuca Morning Glory								PDCON0A141	S3	G4T3
Santa Cruz	PLANT	Ipomoea tenuiloba	Trumpet Morning-glory								PDCON0A1H0	S4	G4
Santa Cruz	PLANT	Ipomoea thurberi	Thurber's Morning-glory								PDCON0A1K0	S1	G3
Santa Cruz	PLANT	Laennecia eriophylla	Woolly Fleabane								PDASTDL020	S2	G3
Santa Cruz	PLANT	Lagascea decipiens	Beguiling Mexican Daisy								PDAST5G010	S4	G5
Santa Cruz	PLANT	Leibnitzia lyrata	Woodland Sunbonnets								PDASTDM010	S4	G5
Santa Cruz	PLANT	Lilaeopsis schaffneriana var. recurva	Huachuca Water-umbel	LE		Y				HS	PDAPI19051	S2	G4T2
Santa Cruz	PLANT	Lilium parryi	Lemmon Lily	SC			S			SR	PMLIL1A0J0	S2	G3
Santa Cruz	PLANT	Lobelia fenestralis	Leafy Lobelia							SR	PDCAM0E0H0	S1	G4
Santa Cruz	PLANT	Lobelia laxiflora	Mexican Lobelia							SR	PDCAM0E0X0	S1	G4
Santa Cruz	PLANT	Loeselia glandulosa	Tropical Spiny Phlox								PDPLM0A010	S2	G4
Santa Cruz	PLANT	Lotus alamosanus	Alamos Deer Vetch				S				PDFAB2A020	S1	G3G4
Santa Cruz	PLANT	Ludwigia palustris	Marsh Purslane								PDONA0B0H0	S1	G5
Santa Cruz	PLANT	Lupinus huachucanus	Huachuca Mountain Lupine				S				PDFAB2B210	S2	G2
Santa Cruz	PLANT	Macroptilium supinum	Supine Bean	SC			S			SR	PDFAB330L0	S1	G2
Santa Cruz	PLANT	Malaxis corymbosa	Madrean Adders Mouth							SR	PMORC1R020	S3S4	G4
Santa Cruz	PLANT	Malaxis porphyrea	Purple Adder's Mouth							SR	PMORC1R0Q0	S2	G4
Santa Cruz	PLANT	Malvastrum bicuspidatum	Mexican Shrub Mallow								PDMAL0S030	S2	G4
Santa Cruz	PLANT	Mammillaria wrightii var. wilcoxii	Wilcox Fishhook Cactus							SR	PDCAC0A0E1	S4	G4T4
Santa Cruz	PLANT	Manihot davisiae	Arizona Manihot				S				PDEUP0Z010	S2	G4
Santa Cruz	PLANT	Marina diffusa	Escoba								PDFAB2F020	S1	G5?
Santa Cruz	PLANT	Metastelma mexicanum	Wiggins Milkweed Vine	SC			S				PDASC050P0	S1S2	G3G4
Santa Cruz	PLANT	Microchloa kunthii	Kunth Grass								PMPOA40010	S1	G5
Santa Cruz	PLANT	Muhlenbergia dubioides	Box Canyon Muhly				S				PMPOA480G0	S1	G1Q
Santa Cruz	PLANT	Muhlenbergia xerophila	Weeping Muhly				S				PMPOA48220	S1	G3
Santa Cruz	PLANT	Nemastylis tenuis	Slender Shell Flower								PMIRI0B040	S1	G5
Santa Cruz	PLANT	Notholaena lemmonii	Lemmon Cloak Fern	SC							PPADI0G0D0	S1S2	G3?
Santa Cruz	PLANT	Ophioglossum engelmannii	Engelmann Adders Tongue								PPOPH02040	S1	G5
Santa Cruz	PLANT	Opuntia versicolor	Stag-horn Cholla							SR	PDCAC0D1K0	S2S3	G4
Santa Cruz	PLANT	Paspalum virletii	Virlet Paspalum				S				PMPOA4P1L0	S1	G3?
Santa Cruz	PLANT	Passiflora arizonica	Arizona Passionflower				S				PDPAS01073	S2	G5T3T5
Santa Cruz	PLANT	Passiflora bryonioides	Mossy Passionflower								PDPAS01040	S1	G3G5
Santa Cruz	PLANT	Pectis imberbis	Beardless Chinch Weed	SC			S				PDAST6W0A0	S1	G3
Santa Cruz	PLANT	Pediomelum palmeri	Palmer's Breadroot								PDFAB5L0M0	SH	G5
Santa Cruz	PLANT	Pellaea ternifolia	Ternate Cliffbrake								PPADI0H0B0	S2	G5
Santa Cruz	PLANT	Penstemon discolor	Catalina Beardtongue				S			HS	PDSCR1L210	S2	G2
Santa Cruz	PLANT	Penstemon stenophyllus	Narrowleaf Beardtongue								PDSCR1L5V0	S3	G4?
Santa Cruz	PLANT	Penstemon superbus	Superb Beardtongue								PDSCR1L630	S2?	G3?
Santa Cruz	PLANT	Phyllanthus polygonoides	Knotleaf Flower								PDEUP130E0	S2	G5
Santa Cruz	PLANT	Physalis latiphysa	Broad-leaf Ground-cherry				S				PDSOL0S0H0	S1	G1
Santa Cruz	PLANT	Plagiobothrys pringlei	Pringle Popcorn-flower								PDBOR0V0V0	S2	G3G4
Santa Cruz	PLANT	Polygala glochidiata	Spiny Milkwort								PDPGL020J0	S2	G5
Santa Cruz	PLANT	Polypogon elongatus	American Rabbitfoot Grass								PMPOA50020	S1	G5
Santa Cruz	PLANT	Psilotum nudum	Whisk Fern				S			HS	PPPSI01020	S1	G5
Santa Cruz	PLANT	Pyrrhopappus rothrockii	False Dandelion								PDAST7V050	S3	G4
Santa Cruz	PLANT	Ranunculus arizonicus	Arizona Buttercup								PDRAN0L0B0	S3	G4
Santa Cruz	PLANT	Rhynchosia edulis	Pan-american Snoutbean								PDFAB3F060	S2S3	G4G5
Santa Cruz	PLANT	Rhynchosia precatoria	Mexican Rosary Bean								PDFAB3F0H0	S2	G4
Santa Cruz	PLANT	Sagittaria longiloba	Flecha de Agua								PMALI040J0	S1	G5
Santa Cruz	PLANT	Samolus vagans	Chiricahua Mountain Brookweed				S				PDPRI09040	S2	G2?
Santa Cruz	PLANT	Schiedeella arizonica	Fallen Ladies'-tresses							SR	PMORC67020	S4	GNR
Santa Cruz	PLANT	Senecio carlomasonii	Seemann Groundsel								PDAST8H3W0	S2S3	G4?Q
Santa Cruz	PLANT	Senecio multidentatus var. huachucanus	Huachuca Groundsel				S			HS	PDAST8H411	S2	G2G4T2
Santa Cruz	PLANT	Sisyrinchium cernuum	Nodding Blue-eyed Grass				S				PMIRI0D0B0	S2	G5
Santa Cruz	PLANT	Solanum lumholtzianum	Lumholtz Nightshade								PDSOL0Z180	S3	G3G4
Santa Cruz	PLANT	Spiranthes delitescens	Canelo Hills Ladies'-tresses	LE						HS	PMORC2B140	S1	G1
Santa Cruz	PLANT	Stenorrhynchos michuacanum	Michoacan Ladies'-tresses							SR	PMORC2B0L0	S3	G4
Santa Cruz	PLANT	Stevia lemmonii	Lemmon's Stevia				S				PDAST8V010	S2	G3G4
Santa Cruz	PLANT	Talinum gooddingii	Goodding's Flameflower								PDPOR08090	S1	G1Q
Santa Cruz	PLANT	Talinum humile	Pinos Altos Flame Flower	SC			S			SR	PDPOR080A0	S1	G2
Santa Cruz	PLANT	Talinum marginatum	Tepic Flame Flower	SC			S			SR	PDPOR080N0	S1	G2
Santa Cruz	PLANT	Tephrosia thurberi	Thurber Hoary Pea								PDFAB3X0M0	S3	G4G5
Santa Cruz	PLANT	Tillandsia recurvata	Ball Moss								PMBRO090E0	S2	G5
Santa Cruz	PLANT	Tithonia thurberi	Thurber Tithonia								PDAST9A030	S4	G4

COUNTY	TAXON	SCIENTIFIC NAME	COMMON NAME	ESA	BLM	CRIT HAB	USFS	NESL	MEXFED	STATE	ELCODE	S RANK	G RANK
Santa Cruz	PLANT	Tragia laciniata	Sonoran Noseburn				S				PDEUP1D060	S3?	G3G4
Santa Cruz	PLANT	Tripsacum lanceolatum	Mexican Gama Grass								PMPOA68030	S2S3	G4
Santa Cruz	PLANT	Viola umbraticola	Shade Violet				S				PDVIO042E0	S2?	G3G4
Santa Cruz	REPTILE	Aspidoscelis burti stictogrammus	Giant Spotted Whiptail	SC			S				ARACJ02011	S2	G4T4
Santa Cruz	REPTILE	Crotalus lepidus klauberi	Banded Rock Rattlesnake						PR		ARADE02051	S3	G5T5
Santa Cruz	REPTILE	Crotalus pricei	Twin-spotted Rattlesnake				S		PR		ARADE02080	S2	G5
Santa Cruz	REPTILE	Crotalus willardi willardi	Arizona Ridge-nosed Rattlesnake				S		PR	WSC	ARADE02132	S1S2	G5T4
Santa Cruz	REPTILE	Gopherus agassizii (Sonoran Population)	Sonoran Desert Tortoise	C			S		A	WSC	ARAAF01013	S4	G4T4
Santa Cruz	REPTILE	Gyalopion canum	Chihuahuan Hook-nosed Snake								ARADB16010	S3	G5
Santa Cruz	REPTILE	Gyalopion quadrangulare	Thornscrub Hook-nosed Snake				S		PR		ARADB16020	S1	G4
Santa Cruz	REPTILE	Heterodon kennerlyi	Mexican Hog-nosed Snake						PR		ARADB17012	S3	G5T4
Santa Cruz	REPTILE	Lampropeltis getula nigrita	Western Black Kingsnake						A		ARADB19026	S3	G5T3T4Q
Santa Cruz	REPTILE	Oxybelis aeneus	Brown Vinesnake				S			WSC	ARADB24010	S1	G5
Santa Cruz	REPTILE	Phrynosoma hernandesi	Greater Short-horned Lizard								ARACF12080	S4	G5
Santa Cruz	REPTILE	Plestiodon callicephalus	Mountain Skink				S				ARACH01030	S2	G4G5
Santa Cruz	REPTILE	Sceloporus slevini	Slevin's Bunchgrass Lizard		S		S				ARACF14180	S2	G4
Santa Cruz	REPTILE	Senticolis triaspis intermedia	Northern Green Ratsnake				S				ARADB44011	S3	G5T4
Santa Cruz	REPTILE	Tantilla wilcoxi	Chihuahuan Black-headed Snake								ARADB35120	S1	G4
Santa Cruz	REPTILE	Tantilla yaquia	Yaqui Black-headed Snake				S				ARADB35130	S2	G4
Santa Cruz	REPTILE	Terrapene ornata luteola	Desert Box Turtle		S				PR		ARAAD08021	S2S3	G5T4
Santa Cruz	REPTILE	Thamnophis eques megalops	Northern Mexican Gartersnake	C			S		A	WSC	ARADB36061	S1	G5T5
Yuma	AMPHIBIAN	Rana yavapaiensis	Lowland Leopard Frog	SC	S		S		PR	WSC	AAABH01250	S3	G4
Yuma	BIRD	Ardea alba	Great Egret							WSC	ABNGA04040	S1B,S4N	G5
Yuma	BIRD	Ardea herodias	Great Blue Heron						|		ABNGA04010	S5	G5
Yuma	BIRD	Athene cunicularia hypugaea	Western Burrowing Owl	SC	S		S	4	A		ABNSB10012	S3	G4T4
Yuma	BIRD	Bubulcus ibis	Cattle Egret								ABNGA07010	S1B,S4N	G5
Yuma	BIRD	Coccyzus americanus	Yellow-billed Cuckoo (Western U.S. DPS)	PS:C			S	2		WSC	ABNRB02020	S3	G5
Yuma	BIRD	Egretta thula	Snowy Egret							WSC	ABNGA06030	S1B,S4N	G5
Yuma	BIRD	Empidonax traillii extimus	Southwestern Willow Flycatcher	LE		Y		2		WSC	ABPAE33043	S1	G5T1T2
Yuma	BIRD	Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	SC	S		S		A	WSC	ABNSB08041	S1	G5T3
Yuma	BIRD	Haliaeetus leucocephalus (wintering pop.)	Bald Eagle - Winter Population	SC	S		S	2	P	WSC	ABNKC10015	S4N	G5TNR
Yuma	BIRD	Himantopus mexicanus	Black-necked Stilt								ABNND01010	S2	G5
Yuma	BIRD	Icterus bullockii	Bullock's Oriole								ABPBXB9220	S4BS1N	G5
Yuma	BIRD	Ixobrychus exilis	Least Bittern						A	WSC	ABNGA02010	S3	G5
Yuma	BIRD	Lanius ludovicianus	Loggerhead Shrike	SC							ABPBR01030	S4	G4
Yuma	BIRD	Laterallus jamaicensis coturniculus	California Black Rail	SC	S				PR	WSC	ABNME03041	S1	G4T1
Yuma	BIRD	Parabuteo unicinctus	Harris's Hawk						A		ABNKC16010	S5	G5
Yuma	BIRD	Rallus longirostris yumanensis	Yuma Clapper Rail	LE					P	WSC	ABNME0501A	S3	G5T3
Yuma	FISH	Cyprinodon macularius	Desert Pupfish	LE		Y			P	WSC	AFCNB02060	S1	G1
Yuma	FISH	Xyrauchen texanus	Razorback Sucker	LE		Y		2	P	WSC	AFCJC11010	S1	G1
Yuma	MAMMAL	Antilocapra americana sonoriensis	Sonoran Pronghorn	LE					P	WSC	AMALD01012	S1	G5T1
Yuma	MAMMAL	Antrozous pallidus	Pallid Bat								AMACC10010	S4	G5
Yuma	MAMMAL	Bat Colony									OBATCOLONY	SU	GNR
Yuma	MAMMAL	Bat Foraging Area	High Netting Concentration								OBATFORAG1	SU	GNR
Yuma	MAMMAL	Corynorhinus townsendii pallescens	Pale Townsend's Big-eared Bat	SC	S		S	4			AMACC08014	S3S4	G4T4
Yuma	MAMMAL	Euderma maculatum	Spotted Bat	SC	S		S		PR	WSC	AMACC07010	S1S2	G4
Yuma	MAMMAL	Eumops perotis californicus	Greater Western Bonneted Bat	SC	S		S				AMACD02011	S3	G5T4
Yuma	MAMMAL	Lasiurus xanthinus	Western Yellow Bat				S			WSC	AMACC05070	S2S3	G5
Yuma	MAMMAL	Leptonycteris curasoae yerbabuenae	Lesser Long-nosed Bat	LE					|	WSC	AMACB03030	S2S3	G4
Yuma	MAMMAL	Macrotus californicus	California Leaf-nosed Bat	SC	S		S			WSC	AMACB01010	S3	G4
Yuma	MAMMAL	Myotis californicus	California Myotis								AMACC01120	S4S5	G5
Yuma	MAMMAL	Myotis yumanensis	Yuma Myotis	SC							AMACC01020	S3S4	G5
Yuma	MAMMAL	Nyctinomops femorosaccus	Pocketed Free-tailed Bat				S				AMACD04010	S3	G4
Yuma	MAMMAL	Peromyscus eremicus	Cactus Mouse								AMAFF03010	S5	G5
Yuma	MAMMAL	Sigmodon hispidus eremicus	Yuma Hispid Cotton Rat	SC							AMAFF07013	S2	G5T2T3
Yuma	MAMMAL	Tadarida brasiliensis	Brazilian Free-tailed Bat								AMACD01010	S3S4	G5
Yuma	PLANT	Allium parishii	Parish Onion		S					SR	PMLIL021N0	S1	G3
Yuma	PLANT	Astragalus insularis	Sand Flat Milk-vetch								PDFAB0F490	S2	G5
Yuma	PLANT	Berberis harrisoniana	Kofa Mt Barberry		S						PDBER02030	S1S2	G1G2
Yuma	PLANT	Calandrinia ambigua	Rock Purslane								PDPOR09010	S2?	G4
Yuma	PLANT	Colubrina californica	California Snakewood								PDRHA05030	S2S3	G4
Yuma	PLANT	Croton wigginsii	Dune Croton								PDEUP0H140	S1	G2G3
Yuma	PLANT	Cryptantha ganderi	Gander's Cryptantha	SC							PDBOR0A120	S1	G1G2
Yuma	PLANT	Drymaria viscosa									PDCAR09090	S1	G3?
Yuma	PLANT	Echinocactus polycephalus var. polycephalus	Clustered Barrel Cactus							SR	PDCAC05033	S2	G3G4T3T4

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Yuma	PLANT	Echinodorus berteroi	Upright Burrhead								PMALI020B0	S1	G5
Yuma	PLANT	Erigeron lobatus	Lobed Fleabane								PDAST3M2C0	S3	G4
Yuma	PLANT	Eriogonum deserticola	Desert Wild-buckwheat								PDPGN081Q0	S1	G4?
Yuma	PLANT	Eryngium nasturtiifolium	Hierba del Sapo								PDAPI0Z0L0	S1	G5
Yuma	PLANT	Eucnide rupestris	Flor de la Piedra								PDLOA02020	S1	G3
Yuma	PLANT	Euphorbia platysperma	Dune Spurge	SC							PDEUP0D1X0	S1	G3
Yuma	PLANT	Ferocactus cylindraceus	Desert Barrel Cactus						PR	SR	PDCAC08080	S4	G5
Yuma	PLANT	Helianthus niveus ssp. tephrodes	Dune Sunflower	SC							PDAST4N0Z2	S2	G4T2
Yuma	PLANT	Lophocereus schottii	Senita						|	SR	PDCAC14010	S1S2	G4
Yuma	PLANT	Nemacaulis denudata	Woolly Heads								PDPGN0G010	S2	G3G4
Yuma	PLANT	Opuntia echinocarpa	Straw-top Cholla							SR	PDCAC0D2W0	S5	G5
Yuma	PLANT	Petalonyx linearis	Longleaf Sandpaper Plant								PDLOA04010	S2	G4
Yuma	PLANT	Pholisma sonorae	Sand Food	SC	S					HS	PDLNN02020	S1	G2
Yuma	PLANT	Pilostyles thurberi	Thurber Pilostyles								PDRAF01010	S2	G5
Yuma	PLANT	Polygonum fusiforme	Needles Knotweed								PDPGN0L110	S3?	G3G4Q
Yuma	PLANT	Rhus kearneyi	Kearney Sumac		S					SR	PDANA08050	S2	G4
Yuma	PLANT	Selaginella eremophila	Desert Spike Moss								PPSEL010G0	S3S4	G4
Yuma	PLANT	Stephanomeria schottii	Schott Wire Lettuce		S						PDAST8U0D0	S2	G2
Yuma	PLANT	Stillingia linearifolia	Linearleaf Sand Spurge								PDEUP1B020	S3S4	G4
Yuma	PLANT	Stillingia spinulosa	Spiny Sand Spurge								PDEUP1B040	S3S4	G4
Yuma	PLANT	Tetracoccus fasciculatus var. hallii	Hall Shrub Spurge								PDEUP1C021	S3S4	G4T4
Yuma	PLANT	Teucrium glandulosum	Desert Germander								PDLAM20040	S3?	G4
Yuma	PLANT	Triteleiopsis palmeri	Blue Sand Lily		S					SR	PMLIL22010	S1	G3
Yuma	PLANT	Washingtonia filifera	California Fan Palm							SR	PMARE0G010	S1	G4
Yuma	REPTILE	Crotalus mitchellii	Speckled Rattlesnake						PR		ARADE02060	S5	G5
Yuma	REPTILE	Crotaphytus bicinctores	Great Basin Collared Lizard								ARACF04010	S4	G5
Yuma	REPTILE	Crotaphytus nebrius	Sonoran Collared Lizard								ARACF04050	S3S4	G4
Yuma	REPTILE	Gopherus agassizii (Sonoran Population)	Sonoran Desert Tortoise	C			S		A	WSC	ARAAF01013	S4	G4T4
Yuma	REPTILE	Heloderma suspectum cinctum	Banded Gila Monster	SC					A		ARACE01011	S4	G4T4
Yuma	REPTILE	Lichanura trivirgata gracia	Desert Rosy Boa	SC							ARADA01021	S3S4	G4G5T3
Yuma	REPTILE	Phrynosoma mcallii	Flat-tailed Horned Lizard	SC					A	WSC	ARACF12040	S2	G3
Yuma	REPTILE	Sauromalus ater (Arizona Population)	Arizona Chuckwalla	SC					A		ARACF13013	S4	G5T4Q
Yuma	REPTILE	Uma rufopunctata	Yuman Desert Fringe-toed Lizard	SC	S				A	WSC	ARACF15040	S2	G3

SNAME	CNAME	OWNERMGT	FEDLIST	CALLIST	GRANK	SRANK	RPLANTRANK
Melitta californica	A mellitid bee	BLM	None	None	G4?	S2?	
Chamaesyce abramsiana	Abrams' spurge	UNKNOWN	None	None	G4	S1.2	2.2
Active Desert Dunes	Active Desert Dunes	DOD, BLM, BOR	None	None	G4	S2.2	
Helianthus niveus ssp. tephrodes	Algodones Dunes sunflower	BLM	None	Endangered	G4T2	S2	1B.2
Lepismadora algodones	Algodones sand jewel beetle	UNKNOWN	None	None	G1	S1	
Taxidea taxus	American badger	BLM, ,BOR, Imperial County	None	None	G5	S4	
Pseudocotalpa andrewsi	Andrew's dune scarab beetle	BLM	None	None	G2G3	S2S3	
Eucnide rupestris	annual rock-nettle	BLM	None	None	G3	S1	2.2
Vireo bellii arizonae	Arizona bell's vireo	BLM, BIA, USFWS	None	Endangered	G5T4	S1	
Digitaria californica	Arizona cottontop	UNKNOWN	None	None	G5	S1.3	2.3
Myotis occultus	Arizona Myotis	UNKNOWN	None	None	G3G4	S2S3	
Pholistoma auritum var. arizonicum	Arizona pholistoma	UNKNOWN	None	None	G5T2T3	S2	2.3
Ipomopsis effusa	Baja California ipomopsis	BLM	None	None	G3?	S1.1	2.1
Heloderma suspectum cinctum	banded gila monster	BLM	None	None	G4T4	S1	
Coleonyx switaki	barefoot gecko		None	Threatened	G4	S1	
Nyctinomops macrotis	big free-tailed bat	UNKNOWN	None	None	G5	S2	
Hymenoxys odorata	bitter hymenoxys	UNKNOWN	None	None	G5	S2	2
Rynchops niger	black skimmer	USFWS, IIWD	None	None	G5	S1S3	
Polioptila melanura	black-tailed gnatcatcher	DFG, BLM, USFWS, BOR, Impe	None	None	G5	S4	
Malperia tenuis	brown turbans	BLM	None	None	G4?	S1.3	2.3
Myiarchus tyrannulus	brown-crested flycatcher	USFWS, BOR, BLM. BIA	None	None	G5	S2S3	
Athene cunicularia	burrowing owl	PVT, IIWD, UP RR, USFWS	None	None	G4	S2	
Laterallus jamaicensis coturniculus	California black rail	USFWS, BLM, IIWD, PVT	None	Threatened	G4T1	S1	
Pelecanus occidentalis californicus	California brown pelican	PVT-IMPERIAL IRRIGATION DI	Delisted	Delisted	G4T3	S1S2	
Larus californicus	California gull	PVT-IMPERIAL IRRIGATION DI	None	None	G5	S2	
Macrotus californicus	California leaf-nosed bat	BLM, DOD	None	None	G4	S2S3	
Anomala carlsoni	Carlson's dune beetle	BLM	None	None	G2	S2	
Hydroprogne caspia	Caspian tern	USFWS-SALTON SEA NWR	None	None	G5	S4	
Myotis velifer	cave myotis	UNKNOWN	None	None	G5	S1	
Abronia villosa var. aurita	chaparral sand-verbena	UNKNOWN	None	None	G5T3T4	S2	1B.1
Oliarces clara	cheeseweed owlfly (cheeseweed moth lacewing)	BLM	None	None	G1G3	S1S3	
Uma notata	Colorado Desert fringe-toed lizard	BLM, DPR	None	None	G3	S2?	
Ptychocheilus lucius	Colorado pikeminnow	UNKNOWN	Endangered	Endangered	G1	SX	
Sigmodon arizonae plenus	Colorado River cotton rat	PVT-SDGE, OTHERS	None	None	G5T2T3	SH	
Neotoma albigula venusta	Colorado Valley woodrat	BLM, UNKNOWN	None	None	G5T3T4	S1S2	
Accipiter cooperii	Cooper's hawk	BLM, BIA-FORT YUMA RES	None	None	G5	S3	
Scaphiopus couchii	Couch's spadefoot	BLM, UP RR	None	None	G5	S2S3	
Senna covesii	Cove's cassia	DOD-CHOCOLATE MOUNTAIN	None	None	G5?	S2	2.2
Toxostoma crissale	Crissal thrasher	DFG, Imperial County, USFWS	None	None	G5	S3	
Crucifixion Thorn Woodland	Crucifixion Thorn Woodland	BLM-ACEC	None	None	G3	S1.2	
Mentzelia puberula	Darlington's blazing star	BLM	None	None	G4	S2	2.2
Desert Fan Palm Oasis Woodland	Desert Fan Palm Oasis Woodland	UNKNOWN	None	None	G3	S3.2	
Cyprinodon macularius	desert pupfish	BLM, PVT, BOR, IIWD, DFG, US	Endangered	Endangered	G1	S1	
Gopherus agassizii	desert tortoise	BLM, PVT, STATE, DOD, PVT	Threatened	Threatened	G4	S2	
Teucrium cubense ssp. depressum	dwarf germander	BLM	None	None	G4G5T3T4	S2	2.2
Micrathene whitneyi	elf owl	UNKNOWN	None	Endangered	G5	S1	
Castela emoryi	Emory's crucifixion-thorn	BLM	None	None	G2G3	S2S3	2.3
Buteo regalis	ferruginous hawk	UNKNOWN	None	None	G4	S3S4	
Chamaesyce platysperma	flat-seeded spurge	DOD-NAVY	None	None	G3	S1.2?	1B.2

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Phrynosoma mcallii	flat-tailed horned lizard	DOD, BLM, DFG, IIWD, DPR	None	None	G3	S2	
Palafoxia arida var. gigantea	giant spanish-needle	BLM	None	None	G5T3	S2	1B.3
Melanerpes uropygialis	Gila woodpecker	DPR, BOR, BLM, USFWS, PVT	None	Endangered	G5	S1S2	
Colaptes chrysoides	gilded flicker	BLM, BIA-FORT YUMA RES	None	Endangered	G5	S1	
Ditaxis claryana	glandular ditaxis	DPR-PICACHO SRA, BLM	None	None	G4G5	S1	2.2
Astragalus sabulonum	gravel milk-vetch	BLM	None	None	G5	S2	2.2
Junco hyemalis caniceps	gray-headed junco	UNKNOWN	None	None	G5T5	S1	
Ardea herodias	great blue heron	UNKNOWN	None	None	G5	S4	
Ardea alba	great egret	UNKNOWN	None	None	G5	S4	
Gelochelidon nilotica	gull-billed tern	IIWD, USFWS	None	None	G5	S1	
Mentzelia hirsutissima	hairy stickleaf	BLM	None	None	G3?	S2S3	2.3
Anomala hardyorum	Hardy's dune beetle	BLM	None	None	G2	S2	
Astragalus insularis var. harwoodii	Harwood's milk-vetch	BLM	None	None	G5T3	S2.2?	2.2
Lasiurus cinereus	hoary bat	PVT-SDGE, OTHERS	None	None	G5	S4?	
Toxostoma lecontei	Le Conte's thrasher	BLM	None	None	G3	S3	
Ixobrychus exilis	least bittern	BLM	None	None	G5	S1	
Linanthus maculatus	Little San Bernardino Mtns. linanthus	BLM	None	None	G2	S2	1B.2
Bursera microphylla	little-leaf elephant tree	UNKNOWN	None	None	G4	S2	2.3
Lanius ludovicianus	loggerhead shrike	USFWS, BLM, PVT	None	None	G4	S4	
Lithobates yavapaiensis	lowland (=Yavapai, San Sebastian & San Felipe) leopa	BLM	None	None	G4	SX	
Oreothlypis luciae	Lucy's warbler	UNKNOWN	None	None	G5	S2S3	
Falco columbarius	merlin	UNKNOWN	None	None	G5	S3	
Hulsea mexicana	Mexican hulsea	UNKNOWN	None	None	G3G4	S1.3	2.3
Charadrius montanus	mountain plover	USFWS-SALTON SEA NWR	Proposed Threat	None	G2	S2?	
Lupinus excubitus var. medius	Mountain Springs bush lupine	BLM-EL CENTRO RA	None	None	G4T2T3	S2	1B.3
Nama stenocarpum	mud nama	UNKNOWN	None	None	G4G5	S1S2	2.2
Cylindropuntia munzii	Munz's cholla	DOD-NAVY, BLM-EL CENTRO F	None	None	G3	S1.2	1B.3
Ovis canadensis nelsoni	Nelson's bighorn sheep	DOD, BLM	None	None	G4T4	S3	
Lithobates pipiens	northern leopard frog	UNKNOWN	None	None	G5	S2	
Xylorhiza orcuttii	Orcutt's woody-aster	BLM, DPR, State Lands	None	None	G2G3	S2	1B.2
Salvia greatae	Orocopia sage	PVT, BLM, DOD, SALTON SEA S	None	None	G2	S2	1B.3
Antrozous pallidus	pallid bat	BLM, PVT, DOD	None	None	G5	S3	
Chaetodipus fallax pallidus	pallid San Diego pocket mouse	BLM, UNKNOWN	None	None	G5T3	S3	
Perognathus longimembris bangsi	Palm Springs pocket mouse	PVT-IMPERIAL IRRIGATION DI	None	None	G5T2T3	S2S3	
Lycium parishii	Parish's desert-thorn	BLM	None	None	G3?	S2S3	2.3
Astragalus magdalenae var. peirsonii	Peirson's milk-vetch	BLM	Threatened	Endangered	G3G4T2	S2	1B.2
Chaenactis carphoclinia var. peirsonii	Peirson's pincushion	DPR, STATE LANDS COMMISSI	None	None	G5T1	S1.3	1B.3
Ovis canadensis nelsoni DPS	peninsular bighorn sheep	BLM, PVT	Endangered	Threatened	G4T3Q	S1	
Calliandra eriophylla	pink fairy-duster	PVT, BLM	None	None	G5	S2S3	2.3
Nyctinomops femorosaccus	pocketed free-tailed bat	DOD	None	None	G4	S2S3	
Falco mexicanus	prairie falcon		None	None	G5	S3	
Acmispon haydonii	pygmy lotus	BLM	None	None	G3	S2.3?	1B.3
Xyrauchen texanus	razorback sucker	PVT, BOR, BLM, USFWS	Endangered	Endangered	G1	S1	
Crotalus ruber	red-diamond rattlesnake	BLM	None	None	G4	S2?	
Carnegiea gigantea	saguaro	BLM	None	None	G5	S1.2	2.2
Symphyotrichum defoliatum	San Bernardino aster	UNKNOWN	None	None	G2	S2	1B.2
Chylismia arenaria	sand evening-primrose	BLM, DOD	None	None	G4?	S2	2.2
Pholisma sonorae	sand food	BLM, DOD	None	None	G2	S2	1B.2
Asio flammeus	short-eared owl	UNKNOWN	None	None	G5	S3	

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Nemacaulis denudata var. gracilis	slender cottonheads	BLM	None	None	G3G4T3?	S2	2.2
Ipomopsis tenuifolia	slender-leaved ipomopsis	UNKNOWN	None	None	G3G4	S2	2.3
Koeberlinia spinosa ssp. tenuispina	slender-spined all-thorn	DOD, BLM	None	None	G4T4	S2.2	2.2
Sonoran Cottonwood Willow Riparian Forest	Sonoran Cottonwood Willow Riparian Forest	DPR, BIA, BOR, USFWS	None	None	G2	S1.1	
Incilius alvarius	Sonoran desert toad	USFWS-CIBOLA NWR	None	None	G5	SH	
Dendroica petechia sonorana	Sonoran yellow warbler	BLM, BIA-FORT YUMA RES	None	None	G5T2T3	S1	
Onychomys torridus ramona	southern grasshopper mouse	BLM, UNKNOWN	None	None	G5T3?	S3?	
Streptanthus campestris	southern jewel-flower	BLM	None	None	G2	S2.3	1B.3
Empidonax traillii extimus	southwestern willow flycatcher	BLM	Endangered	Endangered	G5T1T2	S1	
Matelea parvifolia	spear-leaf matelea	UNKNOWN, BLM	None	None	G5?	S2.2	2.3
Stabilized and Partially Stabilized Desert Dunes	Stabilized and Partially Stabilized Desert Dunes	DOD, BLM, BOR	None	None	G4	S3.2	
Geraea viscida	sticky geraea	BLM, UNKNOWN	None	None	G3	S2.3?	2.3
Piranga rubra	summer tanager	BLM, BIA, USFWS, BOR, IMP, I	None	None	G5	S2	
Pilostyles thurberi	Thurber's pilostyles	DOD, BLM, BOR	None	None	G5	S3.3	4.3
Corynorhinus townsendii	Townsend's big-eared bat	PVT-SDGE, BLM	None	None	G4	S2S3	
Transmontane Alkali Marsh	Transmontane Alkali Marsh	BLM-ACEC, PVT	None	None	G3	S2.1	
Pyrocephalus rubinus	vermilion flycatcher	BLM, BIA-FORT YUMA RES	None	None	G5	S2S3	
Eumops perotis californicus	western mastiff bat	BLM, DOD	None	None	G5T4	S3?	
Myotis ciliolabrum	western small-footed myotis	DOD-CHOCOLATE MOUNTAIN	None	None	G5	S2S3	
Lasiurus xanthinus	western yellow bat	UNKNOWN	None	None	G5	S3	
Coccyzus americanus occidentalis	western yellow-billed cuckoo	BOR, BLM, USFWS, DPR, PVT,	Candidate	Endangered	G5T3Q	S1	
Plegadis chihi	white-faced ibis	USFWS-SALTON SEA NWR	None	None	G5	S1	
Opuntia wigginsii	Wiggins' cholla	BLM	None	None	G3?Q	S1?	3.3
Dendroica petechia brewsteri	yellow warbler	UNKNOWN	None	None	G5T3?	S2	
Icteria virens	yellow-breasted chat	DFG, USFWS, BLM, BIA, DPR	None	None	G5	S3	
Rallus longirostris yumanensis	Yuma clapper rail	DFG, PVT, USFWS, BLM, BOR,	Endangered	Threatened	G5T3	S1	
Sigmodon hispidus eremicus	Yuma hispid cotton rat	BOR, BLM, STATE, PVT, DFG	None	None	G5T2T3	S2	
Puma concolor browni	Yuma mountain lion	UNKNOWN	None	None	G5T1T2Q	S1	
Myotis yumanensis	Yuma myotis	BLM	None	None	G5	S4?	

APPENDIX F
AIR QUALITY CALCULATIONS

CALCULATION SHEET-COMBUSTION EMISSIONS-CONSTRUCTION-COCHISE COUNTY

Assumptions for Combustion Emissions					
Type of Construction Equipment	Num. of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Water Truck	1	300	8	320	768000
Diesel Road Compactors	1	100	8	90	72000
Diesel Dump Truck	3	300	8	90	648000
Diesel Excavator	1	300	8	90	216000
Diesel Hole Trenchers	2	175	8	320	896000
Diesel Bore/Drill Rigs	2	300	8	320	1536000
Diesel Cement & Mortar Mixers	1	300	8	320	768000
Diesel Cranes	1	175	8	320	448000
Diesel Graders	1	300	8	90	216000
Diesel Tractors/Loaders/Backhoes	1	100	8	90	72000
Diesel Bulldozers	1	300	8	90	216000
Diesel Front-End Loaders	2	300	8	320	1536000
Diesel Forklifts	1	100	8	365	292000
Diesel Generator Set	2	40	8	365	233600

Emission Factors							
Type of Construction Equipment	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr	CO2 g/hp-hr
Water Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Road Compactors	0.370	1.480	4.900	0.340	0.330	0.740	536.200
Diesel Dump Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Excavator	0.340	1.300	4.600	0.320	0.310	0.740	536.300
Diesel Trenchers	0.510	2.440	5.810	0.460	0.440	0.740	535.800
Diesel Bore/Drill Rigs	0.600	2.290	7.150	0.500	0.490	0.730	529.700
Diesel Cement & Mortar Mixers	0.610	2.320	7.280	0.480	0.470	0.730	529.700
Diesel Cranes	0.440	1.300	5.720	0.340	0.330	0.730	530.200
Diesel Graders	0.350	1.360	4.730	0.330	0.320	0.740	536.300
Diesel Tractors/Loaders/Backhoes	1.850	8.210	7.220	1.370	1.330	0.950	691.100
Diesel Bulldozers	0.360	1.380	4.760	0.330	0.320	0.740	536.300
Diesel Front-End Loaders	0.380	1.550	5.000	0.350	0.340	0.740	536.200
Diesel Forklifts	1.980	7.760	8.560	1.390	1.350	0.950	690.800
Diesel Generator Set	1.210	3.760	5.970	0.730	0.710	0.810	587.300

CALCULATION SHEET-COMBUSTION EMISSIONS-CONSTRUCTION-COCHISE COUNTY

Emission factors (EF) were generated from the NONROAD2005 model for the 2006 calendar year. The VOC EFs includes exhaust and evaporative emissions. The VOC evaporative components included in the NONROAD2005 model are diurnal, hotsoak, running loss, tank permeation, hose permeation, displacement, and spillage. The construction equipment age distribution in the NONROAD2005 model is based on the population in U.S. for the 2006 calendar year.

Emission Calculations							
Type of Construction Equipment	VOC tons/yr	CO tons/yr	NOx tons/yr	PM-10 tons/yr	PM-2.5 tons/yr	SO2 tons/yr	CO2 tons/yr
Water Truck	0.372	1.752	4.646	0.347	0.339	0.626	453.636
Diesel Road Paver	0.029	0.117	0.389	0.027	0.026	0.059	42.544
Diesel Dump Truck	0.314	1.478	3.920	0.293	0.286	0.528	382.755
Diesel Excavator	0.081	0.309	1.095	0.076	0.074	0.176	127.657
Diesel Hole Cleaners\Trenchers	0.504	2.409	5.737	0.454	0.434	0.731	529.045
Diesel Bore/Drill Rigs	1.016	3.876	12.103	0.846	0.829	1.236	896.608
Diesel Cement & Mortar Mixers	0.516	1.963	6.161	0.406	0.398	0.618	448.304
Diesel Cranes	0.217	0.642	2.824	0.168	0.163	0.360	261.758
Diesel Graders	0.083	0.324	1.126	0.079	0.076	0.176	127.657
Diesel Tractors/Loaders/Backhoes	0.147	0.651	0.573	0.109	0.106	0.075	54.835
Diesel Bulldozers	0.086	0.328	1.133	0.079	0.076	0.176	127.657
Diesel Front-End Loaders	0.643	2.624	8.463	0.592	0.576	1.253	907.611
Diesel Aerial Lifts	0.637	2.497	2.754	0.447	0.434	0.306	222.288
Diesel Generator Set	0.311	0.968	1.537	0.188	0.183	0.209	151.187
Total Emissions	**4.957**	**19.940**	**52.462**	**4.111**	**3.999**	**6.529**	**4733.541**

Conversion factors	
Grams to tons	1.102E-06

CALCULATION SHEET-TRANSPORTATION COMBUSTION EMISSIONS-CONSTRUCTION-COCHISE COUNTY

Construction Worker Personal Vehicle Commuting to Construction Site-Passenger and Light Duty Trucks									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of cars	Number of trucks	Total Emissions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	60	320	25	25	0.72	0.85	1.57
CO	12.4	15.7	60	320	25	25	6.56	8.30	14.86
NOx	0.95	1.22	60	320	25	25	0.50	0.65	1.15
PM-10	0.0052	0.0065	60	320	25	25	0.00	0.00	0.01
PM 2.5	0.0049	0.006	60	320	25	25	0.00	0.00	0.01
CO2	369	511	60	320	25	25	195.19	270.30	465.48

Heavy Duty Trucks Delivery Supply Trucks to Construction Site									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	10,000-19,500 lb Delivery Truck	33,000-60,000 lb semi trailer rig	Mile/day	Day/yr	Number of trucks	Number of trucks	Total Emissions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	0.29	0.55	60	320	4	4	0.02	0.05	0.07
CO	1.32	3.21	60	320	4	4	0.11	0.27	0.38
NOx	4.97	12.6	60	320	4	4	0.42	1.07	1.49
PM-10	0.12	0.33	60	320	4	4	0.01	0.03	0.04
PM 2.5	0.13	0.36	60	320	4	4	0.01	0.03	0.04
CO2	536	536	60	320	4	4	45.36	45.36	90.73
Commute of Staff Maintaining Towers Associated with Proposed Action									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of Cars	Number of trucks	Total Emissions cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	80	272		1	-	0.04	0.04
CO	12.4	15.7	80	272		1	-	0.38	0.38
NOx	0.95	1.22	80	272		1	-	0.03	0.03
PM-10	0.0052	0.0065	80	272		1	-	0.00	0.00
PM 2.5	0.0049	0.006	80	272		1	-	0.00	0.00
CO2	369	511	80	272		1	-	12.25	12.25

Truck Emission Factor Source: MOBILE6.2 USEPA 2005 Emission Facts: Average annual emissions and fuel consumption for gasoline-fueled passenger cars and light trucks. EPA 420-F-05-022 August 2005. Emission rates were generated using MOBILE.6 highway.

OPERATION EMISSIONS FROM 25kW PROPANE GENERATOR

Assumptions for Combustion Emissions					
Type of Construction Equipment	Num. of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Propane-off grid	2	30	8	365	175200
Propane-on grid	5	30	2	12	3600

Emission Factors							
Type of Construction Equipment	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr	CO2 g/hp-hr
Propane Generator Set	2.03	31.91	9.93	0.06	0.06	0.01	653.9

Emission factors (EF) were generated from the NONROAD2005 model for the 2006 calendar year. The VOC EFs includes exhaust and evaporative emissions. The VOC evaporative components included in the NONROAD2005 model are diurnal, hotsoak, running loss, tank permeation, hose permeation, displacement, and spillage. The construction equipment age distribution in the NONROAD2005 model is based on the population in U.S. for the 2006 calendar year.

Emission Calculations							
Type of Construction Equipment	VOC tons/yr	CO tons/yr	NOx tons/yr	PM-10 tons/yr	PM-2.5 tons/yr	SO2 tons/yr	CO2 tons/yr
Propoane Generator Set-off grid	0.393	6.162	1.917	0.011	0.011	0.002	126.240
Propoane Generator Set-on grid	0.008	0.127	0.039	0.000	0.000	0.000	2.594
Total Emissions	**0.401**	**6.288**	**1.956**	**0.011**	**0.011**	**0.003**	**128.834**

Conversion factors	
Grams to tons	1.102E-06

CALCULATION SHEET-FUGITIVE DUST-CONSTRUCTION-COCHISE COUNTY

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM10/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM10/acre-month	MRI 1996; EPA 2001; EPA 2006

PM2.5 Emissions

PM2.5 Multiplier	0.10	(10% of PM10 emissions assumed to be PM2.5)	EPA 2001; EPA 2006
Control Efficiency	0.50	(assume 50% control efficiency for PM10 and PM2.5 emissions)	EPA 2001; EPA 2006

Project Assumptions

Construction Area (0.19 ton PM10/acre-month)

			Conversion Factors	
Duration of Construction Project	6	months	0.000022957	acres per feet
Length		miles	5280	feet per mile
Length (converted)	0	feet		
Width		feet		
Area	5.00	acres		

Assume that each site is equal to or less than 1 acre and each tower will require 6 weeks of construction

Road Construction & Improvements

Duration of Construction Project	6	months
Length	4	miles
Length (converted)	21120	feet
Width	16	feet
Area	7.76	acres

Assume that road impovements complete 4 miles per month

	Project Emissions (tons/year)			
	PM10 uncontrolled	PM10 controlled	PM2.5 uncontrolled	PM2.5 controlled
Construction Area (0.19 ton PM10/ac	5.70	2.85	0.57	0.29
Road Construction & Improvements	19.55	9.77	1.95	0.98
Total	**25.25**	**12.62**	**2.52**	**1.26**

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.*Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM10/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM10/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM10/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions from Construction Operations, calculated the 0.19 ton PM10/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM10/acre-month) and 75% of the average emission factor (0.11 ton PM10/acre-month).

The 0.19 ton PM10/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM10/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particle (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District and the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM10 and PM2.5 in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM10/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM10/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

PM2.5 Multiplier **0.10**

PM2.5 emissions are estimated by applying a particle size multiplier of 0.10 to PM10 emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM10 and PM2.5 **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM10 and PM2.5 in PM nonattainment areas. Wetting controls will be applied during project construction (EPA 2006).

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Pollutant (Official [AP-42] Notation)	Emission Factor		Amount of Charge (lb)	Total Emissions (lbs)	Total Emissions (tons)
	lb/item	lb/lb NEW			
Carbon dioxide	1.3E+01	1.3E+00	2000	2601.7	1.301
Carbon monoxide	6.4E-02	6.3E-03	2000	12.7	0.006
Lead	3.8E-02	3.7E-03	2000	7.5	0.004
Oxides of nitrogen	7.0E-02	6.9E-03	2000	13.8	0.007
PM-2.5	1.5E-01	1.4E-02	2000	28.8	0.014
PM-10	3.5E-01	3.5E-02	2000	69.6	0.035
Methane	ND	ND	1000	ND	ND
Sulfur dioxide	ND	ND	1000	ND	ND

2000

AP-42 (2009). Compilation of Air Pollutant Emission Factors, Volume 1. 15.9 Blasting Caps, Demolition charges, and Detonators. AP-42, Fifth Edition, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, January, 1995.

CALCULATION SHEET-SUMMARY OF EMISSIONS-COCHISE COUNTY

Proposed Action Construction Emissions for Criteria Pollutants (tons per year)									
Emission Source	VOC	CO	NOx	PM-10	PM-2.5	**SO2**	**CO2**	**CO2 Equivalents**	**Total CO2**
Combustion Emissions	4.96	19.94	52.46	4.11	4.00	6.53	4733.54	16439.48	21173.02
Construction Site-Fugitive PM-10	NA	NA	NA	12.62	1.26	NA	NA	NA	NA
Construction Workers Commuter & Trucking	1.64	15.25	2.63	0.04	0.05	NA	465.48	860.49	1325.98
Blasting	0.00	0.01	0.01	0.03	0.01	0.00	1.30	2.15	3.45
Total emissions-CONSTRUCTION	**6.60**	**35.19**	**55.10**	**16.81**	**5.32**	**6.53**	**5200.33**	**17302.13**	**22502.45**
Propane Generators	0.40	6.29	1.96	0.01	0.01	0.00	128.83	618	747
Maintenance commute	0.04	0.38	0.03	0.00	0.00	NA	12.25	10.06	22.32
Total Emissions-OPERATIONS	**0.44**	**6.66**	**1.99**	**0.01**	**0.01**	**0.00**	**141.09**	**628**	**770**
De minimis Thresholds	100	100	100	100	100	100			27,557

1. Cochise County is in non-attainment for PM-10.

Carbon Equivalents	Conversion Factor
N2O or NOx	311
Methane or VOCs	25

Source: EPA 2010 Reference, Tables and Conversions, Inventory of U.S. Greenhouse Gas Emissions and Sinks; http://www.epa.gov/climatechange/emissions/usinventoryreport.html

CALCULATION SHEET-COMBUSTION EMISSIONS-CONSTRUCTION-IMPERIAL COUNTY

Assumptions for Combustion Emissions					
Type of Construction Equipment	Num. of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Water Truck	1	300	8	90	216000
Diesel Road Compactors	1	100	8	20	16000
Diesel Dump Truck	1	300	8	20	48000
Diesel Excavator	1	300	8	20	48000
Diesel Hole Trenchers	1	175	8	30	42000
Diesel Bore/Drill Rigs	1	300	8	60	144000
Diesel Cement & Mortar Mixers	1	300	8	60	144000
Diesel Cranes	1	175	8	60	84000
Diesel Graders	1	300	8	60	144000
Diesel Tractors/Loaders/Backhoes	1	100	8	60	48000
Diesel Bulldozers	1	300	8	60	144000
Diesel Front-End Loaders	1	300	8	60	144000
Diesel Forklifts	1	100	8	30	24000
Diesel Generator Set	2	40	8	160	102400

Emission Factors							
Type of Construction Equipment	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr	CO2 g/hp-hr
Water Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Road Compactors	0.370	1.480	4.900	0.340	0.330	0.740	536.200
Diesel Dump Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Excavator	0.340	1.300	4.600	0.320	0.310	0.740	536.300
Diesel Trenchers	0.510	2.440	5.810	0.460	0.440	0.740	535.800
Diesel Bore/Drill Rigs	0.600	2.290	7.150	0.500	0.490	0.730	529.700
Diesel Cement & Mortar Mixers	0.610	2.320	7.280	0.480	0.470	0.730	529.700
Diesel Cranes	0.440	1.300	5.720	0.340	0.330	0.730	530.200
Diesel Graders	0.350	1.360	4.730	0.330	0.320	0.740	536.300
Diesel Tractors/Loaders/Backhoes	1.850	8.210	7.220	1.370	1.330	0.950	691.100
Diesel Bulldozers	0.360	1.380	4.760	0.330	0.320	0.740	536.300
Diesel Front-End Loaders	0.380	1.550	5.000	0.350	0.340	0.740	536.200
Diesel Forklifts	1.980	7.760	8.560	1.390	1.350	0.950	690.800
Diesel Generator Set	1.210	3.760	5.970	0.730	0.710	0.810	587.300

CALCULATION SHEET-COMBUSTION EMISSIONS-CONSTRUCTION-IMPERIAL COUNTY

Emission factors (EF) were generated from the NONROAD2005 model for the 2006 calendar year. The VOC EFs includes exhaust and evaporative emissions. The VOC evaporative components included in the NONROAD2005 model are diurnal, hotsoak, running loss, tank permeation, hose permeation, displacement, and spillage. The construction equipment age distribution in the NONROAD2005 model is based on the population in U.S. for the 2006 calendar year.

Emission Calculations							
Type of Construction Equipment	VOC tons/yr	CO tons/yr	NOx tons/yr	PM-10 tons/yr	PM-2.5 tons/yr	SO2 tons/yr	CO2 tons/yr
Water Truck	0.105	0.493	1.307	0.098	0.095	0.176	127.585
Diesel Road Paver	0.007	0.026	0.086	0.006	0.006	0.013	9.454
Diesel Dump Truck	0.023	0.109	0.290	0.022	0.021	0.039	28.352
Diesel Excavator	0.018	0.069	0.243	0.017	0.016	0.039	28.368
Diesel Hole Cleaners\Trenchers	0.024	0.113	0.269	0.021	0.020	0.034	24.799
Diesel Bore/Drill Rigs	0.095	0.363	1.135	0.079	0.078	0.116	84.057
Diesel Cement & Mortar Mixers	0.097	0.368	1.155	0.076	0.075	0.116	84.057
Diesel Cranes	0.041	0.120	0.529	0.031	0.031	0.068	49.080
Diesel Graders	0.056	0.216	0.751	0.052	0.051	0.117	85.104
Diesel Tractors/Loaders/Backhoes	0.098	0.434	0.382	0.072	0.070	0.050	36.556
Diesel Bulldozers	0.057	0.219	0.755	0.052	0.051	0.117	85.104
Diesel Front-End Loaders	0.060	0.246	0.793	0.056	0.054	0.117	85.089
Diesel Aerial Lifts	0.052	0.205	0.226	0.037	0.036	0.025	18.270
Diesel Generator Set	0.137	0.424	0.674	0.082	0.080	0.091	66.274
Total Emissions	**0.869**	**3.406**	**8.597**	**0.702**	**0.684**	**1.120**	**812.150**

Conversion factors	
Grams to tons	1.102E-06

CALCULATION SHEET-TRANSPORTATION COMBUSTION EMISSIONS-CONSTRUCTION-IMPERIAL COUNTY

Construction Worker Personal Vehicle Commuting to Construction Site-Passenger and Light Duty Trucks									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of cars	Number of trucks	Total Emissions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	60	180	10	10	0.16	0.19	0.35
CO	12.4	15.7	60	180	10	10	1.48	1.87	3.34
NOx	0.95	1.22	60	180	10	10	0.11	0.15	0.26
PM-10	0.0052	0.0065	60	180	10	10	0.00	0.00	0.00
PM 2.5	0.0049	0.006	60	180	10	10	0.00	0.00	0.00
CO2	369	511	60	180	10	10	43.92	60.82	104.73

Heavy Duty Trucks Delivery Supply Trucks to Construction Site									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	10,000-19,500 lb Delivery Truck	33,000-60,000 lb semi trailer rig	Mile/day	Day/yr	Number of trucks	Number of trucks	Total Emissions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	0.29	0.55	60	180	1	1	0.00	0.01	0.01
CO	1.32	3.21	60	180	1	1	0.02	0.04	0.05
NOx	4.97	12.6	60	180	1	1	0.06	0.15	0.21
PM-10	0.12	0.33	60	180	1	1	0.00	0.00	0.01
PM 2.5	0.13	0.36	60	180	1	1	0.00	0.00	0.01
CO2	536	536	60	180	1	1	6.38	6.38	12.76
Commute of Staff Maintaining Towers Associated with Proposed Action									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of Cars	Number of trucks	Total Emissions cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	80	53		1	-	0.01	0.01
CO	12.4	15.7	80	53		1	-	0.07	0.07
NOx	0.95	1.22	80	53		1	-	0.01	0.01
PM-10	0.0052	0.0065	80	53		1	-	0.00	0.00
PM 2.5	0.0049	0.006	80	53		1	-	0.00	0.00
CO2	369	511	80	53		1	-	2.39	2.39

Truck Emission Factor Source: MOBILE6.2 USEPA 2005 Emission Facts: Average annual emissions and fuel consumption for gasoline-fueled passenger cars and light trucks. EPA 420-F-05-022 August 2005. Emission rates were generated using MOBILE.6 highway.

CALCULATION SHEET-TRANSPORTATION COMBUSTION EMISSIONS-CONSTRUCTION-IMPERIAL COUNTY

Conversion factor:	gms to tons
	0.000001102

Carbon Equivalents	Conversion Factor
N2O or NOx	311
Methane or VOCs	25

Source: EPA 2010 Reference, Tables and Conversions, Inventory of U.S. Greenhouse Gas Emissions and Sinks; http://www.epa.gov/climatechange/emissions/usinventoryreport.html

CARBON EQUIVALENTS

Construction Commuters	Conversion	Emissions CO2 tons/yr	Total CO2
VOCs	25	8.84	
NOx	311	0.26	
Total		9.10	113.83

Delivery Trucks	Conversion	Emissions CO2 tons/yr	Total CO2
VOCs	25	0.25	
NOx	311	65.03	
Total		65.28	78.04

Kirtland AFB staff and Students	Conversion	Emissions CO2 tons/yr	Total CO2
VOCs	25	0.19	
NOx	311	1.77	
Total		1.96	4.35

OPERATION EMISSIONS FROM 25kW PROPANE GENERATOR

Assumptions for Combustion Emissions					
Type of Construction Equipment	Num. of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Propane-off grid	1	30	8	365	87600
Propane-on grid	1	30	1	12	360

Emission Factors							
Type of Construction Equipment	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr	CO2 g/hp-hr
Propane Generator Set	2.03	31.91	9.93	0.06	0.06	0.01	653.9

Emission factors (EF) were generated from the NONROAD2005 model for the 2006 calendar year. The VOC EFs includes exhaust and evaporative emissions. The VOC evaporative components included in the NONROAD2005 model are diurnal, hotsoak, running loss, tank permeation, hose permeation, displacement, and spillage. The construction equipment age distribution in the NONROAD2005 model is based on the population in U.S. for the 2006 calendar year.

Emission Calculations							
Type of Construction Equipment	VOC tons/yr	CO tons/yr	NOx tons/yr	PM-10 tons/yr	PM-2.5 tons/yr	SO2 tons/yr	CO2 tons/yr
Propoane Generator Set-off grid	0.196	3.081	0.958	0.005	0.005	0.001	63.120
Propoane Generator Set-on grid	0.001	0.013	0.004	0.000	0.000	0.000	0.259
Total Emissions	**0.197**	**3.094**	**0.962**	**0.005**	**0.005**	**0.001**	**63.379**

Conversion factors	
Grams to tons	1.102E-06

CALCULATION SHEET-FUGITIVE DUST-CONSTRUCTION-IMPERIAL COUNTY

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM10/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM10/acre-month	MRI 1996; EPA 2001; EPA 2006

PM2.5 Emissions

PM2.5 Multiplier	0.10	(10% of PM10 emissions assumed to be PM2.5)	EPA 2001; EPA 2006
Control Efficiency	0.50	(assume 50% control efficiency for PM10 and PM2.5 emissions)	EPA 2001; EPA 2006

Project Assumptions

Construction Area (0.19 ton PM10/acre-month)

Duration of Construction Project	6	months	**Conversion Factors**	
Length		miles	0.000022957	acres per feet
Length (converted)	0	feet	5280	feet per mile
Width		feet		
Area	4.00	acres		

Assume that each site is equal to or less than 1 acre and each tower will require 6 weeks of construction

Road Construction & Improvements

Duration of Construction Project	1.5	months
Length	0.5	miles
Length (converted)	2640	feet
Width	16	feet
Area	0.97	acres

Assume that road impovements complete 4 miles per month

	Project Emissions (tons/year)			
	PM10 uncontrolled	**PM10 controlled**	**PM2.5 uncontrolled**	**PM2.5 controlled**
Construction Area (0.19 ton PM10/ac	4.56	2.28	0.46	0.23
Road Construction & Improvements	0.61	0.31	0.06	0.03
Total	**5.17**	**2.59**	**0.52**	**0.26**

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM10/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM10/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM10/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions from Construction Operations, calculated the 0.19 ton PM10/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM10/acre-month) and 75% of the average emission factor (0.11 ton PM10/acre-month).

The 0.19 ton PM10/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM10/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particle (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District and the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM10 and PM2.5 in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM10/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM10/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

PM2.5 Multiplier **0.10**

PM2.5 emissions are estimated by applying a particle size multiplier of 0.10 to PM10 emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM10 and PM2.5 **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM10 and PM2.5 in PM nonattainment areas. Wetting controls will be applied during project construction (EPA 2006).

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

CALCULATION SHEET-SUMMARY OF EMISSIONS-IMPERIAL COUNTY

Proposed Action Construction Emissions for Criteria Pollutants (tons per year)									
Emission Source	VOC	CO	NOx	PM-10	PM-2.5	**SO2**	**CO2**	**CO2 Equivalents**	**Total CO2**
Combustion Emissions	0.87	3.41	8.60	0.70	0.68	1.12	812.15	2695.24	3507.39
Construction Site-Fugitive PM-10	NA	NA	NA	2.59	0.26	NA	NA	NA	NA
Construction Workers Commuter & Trucking	0.36	3.40	0.47	0.01	0.01	NA	104.73	154.44	259.17
Total emissions-CONSTRUCTION	**1.23**	**6.80**	**9.06**	**3.29**	**0.95**	**1.12**	**917**	**2,850**	**3,767**
Propane Generators	0.20	3.09	0.96	0.01	0.01	0.00	63.38	304	368
Maintenance commute	0.01	0.07	0.01	0.00	0.00	NA	2.39	1.96	4.35
Total Emissions-OPERATIONS	**0.20**	**3.17**	**0.97**	**0.01**	**0.01**	**0.00**	**65.77**	**306**	**372**
De minimis Thresholds	100	100	100	100	100	100			27,557

1. Pima County is in non-attainment for PM-10.

Carbon Equivalents	Conversion Factor
N2O or NOx	311
Methane or VOCs	25

Source: EPA 2010 Reference, Tables and Conversions, Inventory of U.S. Greenhouse Gas Emissions and Sinks; http://www.epa.gov/climatechange/emissions/usinventoryreport.html

CALCULATION SHEET-COMBUSTION EMISSIONS-CONSTRUCTION-PIMA COUNTY

Assumptions for Combustion Emissions					
Type of Construction Equipment	Num. of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Water Truck	1	300	8	160	384000
Diesel Road Compactors	1	100	8	20	16000
Diesel Dump Truck	1	300	8	20	48000
Diesel Excavator	1	300	8	20	48000
Diesel Hole Trenchers	1	175	8	30	42000
Diesel Bore/Drill Rigs	1	300	8	60	144000
Diesel Cement & Mortar Mixers	1	300	8	60	144000
Diesel Cranes	1	175	8	60	84000
Diesel Graders	1	300	8	60	144000
Diesel Tractors/Loaders/Backhoes	1	100	8	60	48000
Diesel Bulldozers	1	300	8	60	144000
Diesel Front-End Loaders	1	300	8	60	144000
Diesel Forklifts	1	100	8	30	24000
Diesel Generator Set	1	40	8	160	51200

Emission Factors							
Type of Construction Equipment	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr	CO2 g/hp-hr
Water Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Road Compactors	0.370	1.480	4.900	0.340	0.330	0.740	536.200
Diesel Dump Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Excavator	0.340	1.300	4.600	0.320	0.310	0.740	536.300
Diesel Trenchers	0.510	2.440	5.810	0.460	0.440	0.740	535.800
Diesel Bore/Drill Rigs	0.600	2.290	7.150	0.500	0.490	0.730	529.700
Diesel Cement & Mortar Mixers	0.610	2.320	7.280	0.480	0.470	0.730	529.700
Diesel Cranes	0.440	1.300	5.720	0.340	0.330	0.730	530.200
Diesel Graders	0.350	1.360	4.730	0.330	0.320	0.740	536.300
Diesel Tractors/Loaders/Backhoes	1.850	8.210	7.220	1.370	1.330	0.950	691.100
Diesel Bulldozers	0.360	1.380	4.760	0.330	0.320	0.740	536.300
Diesel Front-End Loaders	0.380	1.550	5.000	0.350	0.340	0.740	536.200
Diesel Forklifts	1.980	7.760	8.560	1.390	1.350	0.950	690.800
Diesel Generator Set	1.210	3.760	5.970	0.730	0.710	0.810	587.300

CALCULATION SHEET-COMBUSTION EMISSIONS-CONSTRUCTION-PIMA COUNTY

Emission factors (EF) were generated from the NONROAD2005 model for the 2006 calendar year. The VOC EFs includes exhaust and evaporative emissions. The VOC evaporative components included in the NONROAD2005 model are diurnal, hotsoak, running loss, tank permeation, hose permeation, displacement, and spillage. The construction equipment age distribution in the NONROAD2005 model is based on the population in U.S. for the 2006 calendar year.

Emission Calculations							
Type of Construction Equipment	VOC tons/yr	CO tons/yr	NOx tons/yr	PM-10 tons/yr	PM-2.5 tons/yr	SO2 tons/yr	CO2 tons/yr
Water Truck	0.186	0.876	2.323	0.173	0.169	0.313	226.818
Diesel Road Paver	0.007	0.026	0.086	0.006	0.006	0.013	9.454
Diesel Dump Truck	0.023	0.109	0.290	0.022	0.021	0.039	28.352
Diesel Excavator	0.018	0.069	0.243	0.017	0.016	0.039	28.368
Diesel Hole Cleaners\Trenchers	0.024	0.113	0.269	0.021	0.020	0.034	24.799
Diesel Bore/Drill Rigs	0.095	0.363	1.135	0.079	0.078	0.116	84.057
Diesel Cement & Mortar Mixers	0.097	0.368	1.155	0.076	0.075	0.116	84.057
Diesel Cranes	0.041	0.120	0.529	0.031	0.031	0.068	49.080
Diesel Graders	0.056	0.216	0.751	0.052	0.051	0.117	85.104
Diesel Tractors/Loaders/Backhoes	0.098	0.434	0.382	0.072	0.070	0.050	36.556
Diesel Bulldozers	0.057	0.219	0.755	0.052	0.051	0.117	85.104
Diesel Front-End Loaders	0.060	0.246	0.793	0.056	0.054	0.117	85.089
Diesel Aerial Lifts	0.052	0.205	0.226	0.037	0.036	0.025	18.270
Diesel Generator Set	0.068	0.212	0.337	0.041	0.040	0.046	33.137
Total Emissions	**0.882**	**3.578**	**9.276**	**0.737**	**0.718**	**1.211**	**878.246**

Conversion factors	
Grams to tons	1.102E-06

CALCULATION SHEET-TRANSPORTATION COMBUSTION EMISSIONS-CONSTRUCTION-PIMA COUNTY

Construction Worker Personal Vehicle Commuting to Construction Site-Passenger and Light Duty Trucks									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of cars	Number of trucks	Total Emissions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	60	180	20	20	0.32	0.38	0.71
CO	12.4	15.7	60	180	20	20	2.95	3.74	6.69
NOx	0.95	1.22	60	180	20	20	0.23	0.29	0.52
PM-10	0.0052	0.0065	60	180	20	20	0.00	0.00	0.00
PM 2.5	0.0049	0.006	60	180	20	20	0.00	0.00	0.00
CO2	369	511	60	180	20	20	87.83	121.63	209.47

Heavy Duty Trucks Delivery Supply Trucks to Construction Site									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	10,000-19,500 lb Delivery Truck	33,000-60,000 lb semi trailer rig	Mile/day	Day/yr	Number of trucks	Number of trucks	Total Emissions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	0.29	0.55	60	180	2	2	0.01	0.01	0.02
CO	1.32	3.21	60	180	2	2	0.03	0.08	0.11
NOx	4.97	12.6	60	180	2	2	0.12	0.30	0.42
PM-10	0.12	0.33	60	180	2	2	0.00	0.01	0.01
PM 2.5	0.13	0.36	60	180	2	2	0.00	0.01	0.01
CO2	536	536	60	180	2	2	12.76	12.76	25.52
Commute of Staff Maintaining Towers Associated with Proposed Action									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of Cars	Number of trucks	Total Emissions cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	160	53		1	-	0.02	0.02
CO	12.4	15.7	160	53		1	-	0.15	0.15
NOx	0.95	1.22	160	53		1	-	0.01	0.01
PM-10	0.0052	0.0065	160	53		1	-	0.00	0.00
PM 2.5	0.0049	0.006	160	53		1	-	0.00	0.00
CO2	369	511	160	53		1	-	4.78	4.78

Truck Emission Factor Source: MOBILE6.2 USEPA 2005 Emission Facts: Average annual emissions and fuel consumption for gasoline-fueled passenger cars and light trucks. EPA 420-F-05-022 August 2005. Emission rates were generated using MOBILE.6 highway.

OPERATION EMISSIONS FROM 25kW PROPANE GENERATOR

Assumptions for Combustion Emissions					
Type of Construction Equipment	Num. of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Propane-off grid	1	30	8	365	87600
Propane-on grid	1	30	1	12	360

Emission Factors							
Type of Construction Equipment	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr	CO2 g/hp-hr
Propane Generator Set	2.03	31.91	9.93	0.06	0.06	0.01	653.9

Emission factors (EF) were generated from the NONROAD2005 model for the 2006 calendar year. The VOC EFs includes exhaust and evaporative emissions. The VOC evaporative components included in the NONROAD2005 model are diurnal, hotsoak, running loss, tank permeation, hose permeation, displacement, and spillage. The construction equipment age distribution in the NONROAD2005 model is based on the population in U.S. for the 2006 calendar year.

Emission Calculations							
Type of Construction Equipment	VOC tons/yr	CO tons/yr	NOx tons/yr	PM-10 tons/yr	PM-2.5 tons/yr	SO2 tons/yr	CO2 tons/yr
Propoane Generator Set-off grid	0.196	3.081	0.958	0.005	0.005	0.001	63.120
Propoane Generator Set-on grid	0.001	0.013	0.004	0.000	0.000	0.000	0.259
Total Emissions	**0.197**	**3.094**	**0.962**	**0.005**	**0.005**	**0.001**	**63.379**

Conversion factors	
Grams to tons	1.102E-06

CALCULATION SHEET-FUGITIVE DUST-CONSTRUCTION-PIMA COUNTY

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM10/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM10/acre-month	MRI 1996; EPA 2001; EPA 2006

PM2.5 Emissions

PM2.5 Multiplier	0.10	(10% of PM10 emissions assumed to be PM2.5)	EPA 2001; EPA 2006
Control Efficiency	0.50	(assume 50% control efficiency for PM10 and PM2.5 emissions)	EPA 2001; EPA 2006

Project Assumptions

Construction Area (0.19 ton PM10/acre-month)

			Conversion Factors	
Duration of Construction Project	6	months	0.000022957	acres per feet
Length		miles	5280	feet per mile
Length (converted)	0	feet		
Width		feet		
Area	4.00	acres		

Assume that each site is equal to or less than 1 acre and each tower will require 6 weeks of construction

Road Construction & Improvements

Duration of Construction Project	1.5	months
Length	4	miles
Length (converted)	21120	feet
Width	16	feet
Area	7.76	acres

Assume that road impovements complete 4 miles per month

	Project Emissions (tons/year)			
	PM10 uncontrolled	PM10 controlled	PM2.5 uncontrolled	PM2.5 controlled
Construction Area (0.19 ton PM10/ac	4.56	2.28	0.46	0.23
Road Construction & Improvements	4.89	2.44	0.49	0.24
Total	**9.45**	**4.72**	**0.94**	**0.47**

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM10/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM10/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM10/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions from Construction Operations, calculated the 0.19 ton PM10/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM10/acre-month) and 75% of the average emission factor (0.11 ton PM10/acre-month).

The 0.19 ton PM10/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM10/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particle (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District and the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM10 and PM2.5 in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM10/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM10/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

PM2.5 Multiplier **0.10**

PM2.5 emissions are estimated by applying a particle size multiplier of 0.10 to PM10 emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM10 and PM2.5 **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM10 and PM2.5 in PM nonattainment areas. Wetting controls will be applied during project construction (EPA 2006).

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

CALCULATION SHEET-SUMMARY OF EMISSIONS-PIMA COUNTY

Proposed Action Construction Emissions for Criteria Pollutants (tons per year)									
Emission Source	VOC	CO	NOx	PM-10	PM-2.5	**SO2**	**CO2**	**CO2 Equivalents**	**Total CO2**
Combustion Emissions	0.88	3.58	9.28	0.74	0.72	1.21	878.25	2906.92	3785.16
Construction Site-Fugitive PM-10	NA	NA	NA	4.72	0.47	NA	NA	NA	NA
Construction Workers Commuter & Trucking	0.73	6.80	0.93	0.01	0.01	NA	209.47	308.88	518.35
Total emissions-CONSTRUCTION	**1.61**	**10.37**	**10.21**	**5.47**	**1.20**	**1.21**	**1,088**	**3,216**	**4,304**
Propane Generators	0.20	3.09	0.96	0.01	0.01	0.00	63.38	304	368
Maintenance commute	0.02	0.15	0.01	0.00	0.00	NA	4.78	3.92	8.70
Total Emissions-OPERATIONS	**0.21**	**3.24**	**0.97**	**0.01**	**0.01**	**0.00**	**68.15**	**308**	**376**
De minimis Thresholds	100	100	100	100	100	100			27,557

1. Pima County is in non-attainment for PM-10.

Carbon Equivalents	Conversion Factor
N2O or NOx	311
Methane or VOCs	25

Source: EPA 2010 Reference, Tables and Conversions, Inventory of U.S. Greenhouse Gas Emissions and Sinks; http://www.epa.gov/climatechange/emissions/usinventoryreport.html

CALCULATION SHEET-COMBUSTION EMISSIONS-CONSTRUCTION-SANTA CRUZ COUNTY

Assumptions for Combustion Emissions					
Type of Construction Equipment	Num. of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Water Truck	1	300	8	320	768000
Diesel Road Compactors	1	100	8	60	48000
Diesel Dump Truck	1	300	8	60	144000
Diesel Excavator	1	300	8	30	72000
Diesel Hole Trenchers	1	175	8	180	252000
Diesel Bore/Drill Rigs	2	300	8	180	864000
Diesel Cement & Mortar Mixers	1	300	8	180	432000
Diesel Cranes	2	175	8	60	168000
Diesel Graders	1	300	8	60	144000
Diesel Tractors/Loaders/Backhoes	1	100	8	60	48000
Diesel Bulldozers	1	300	8	60	144000
Diesel Front-End Loaders	1	300	8	60	144000
Diesel Forklifts	2	100	8	30	48000
Diesel Generator Set	2	40	8	365	233600

Emission Factors							
Type of Construction Equipment	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr	CO2 g/hp-hr
Water Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Road Compactors	0.370	1.480	4.900	0.340	0.330	0.740	536.200
Diesel Dump Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Excavator	0.340	1.300	4.600	0.320	0.310	0.740	536.300
Diesel Trenchers	0.510	2.440	5.810	0.460	0.440	0.740	535.800
Diesel Bore/Drill Rigs	0.600	2.290	7.150	0.500	0.490	0.730	529.700
Diesel Cement & Mortar Mixers	0.610	2.320	7.280	0.480	0.470	0.730	529.700
Diesel Cranes	0.440	1.300	5.720	0.340	0.330	0.730	530.200
Diesel Graders	0.350	1.360	4.730	0.330	0.320	0.740	536.300
Diesel Tractors/Loaders/Backhoes	1.850	8.210	7.220	1.370	1.330	0.950	691.100
Diesel Bulldozers	0.360	1.380	4.760	0.330	0.320	0.740	536.300
Diesel Front-End Loaders	0.380	1.550	5.000	0.350	0.340	0.740	536.200
Diesel Forklifts	1.980	7.760	8.560	1.390	1.350	0.950	690.800
Diesel Generator Set	1.210	3.760	5.970	0.730	0.710	0.810	587.300

CALCULATION SHEET-COMBUSTION EMISSIONS-CONSTRUCTION-SANTA CRUZ COUNTY

Emission factors (EF) were generated from the NONROAD2005 model for the 2006 calendar year. The VOC EFs includes exhaust and evaporative emissions. The VOC evaporative components included in the NONROAD2005 model are diurnal, hotsoak, running loss, tank permeation, hose permeation, displacement, and spillage. The construction equipment age distribution in the NONROAD2005 model is based on the population in U.S. for the 2006 calendar year.

Emission Calculations							
Type of Construction Equipment	VOC tons/yr	CO tons/yr	NOx tons/yr	PM-10 tons/yr	PM-2.5 tons/yr	SO2 tons/yr	CO2 tons/yr
Water Truck	0.372	1.752	4.646	0.347	0.339	0.626	453.636
Diesel Road Paver	0.020	0.078	0.259	0.018	0.017	0.039	28.363
Diesel Dump Truck	0.070	0.328	0.871	0.065	0.063	0.117	85.057
Diesel Excavator	0.027	0.103	0.365	0.025	0.025	0.059	42.552
Diesel Hole Cleaners\Trenchers	0.142	0.678	1.613	0.128	0.122	0.206	148.794
Diesel Bore/Drill Rigs	0.571	2.180	6.808	0.476	0.467	0.695	504.342
Diesel Cement & Mortar Mixers	0.290	1.104	3.466	0.229	0.224	0.348	252.171
Diesel Cranes	0.081	0.241	1.059	0.063	0.061	0.135	98.159
Diesel Graders	0.056	0.216	0.751	0.052	0.051	0.117	85.104
Diesel Tractors/Loaders/Backhoes	0.098	0.434	0.382	0.072	0.070	0.050	36.556
Diesel Bulldozers	0.057	0.219	0.755	0.052	0.051	0.117	85.104
Diesel Front-End Loaders	0.060	0.246	0.793	0.056	0.054	0.117	85.089
Diesel Aerial Lifts	0.105	0.410	0.453	0.074	0.071	0.050	36.541
Diesel Generator Set	0.311	0.968	1.537	0.188	0.183	0.209	151.187
Total Emissions	**2.261**	**8.958**	**23.759**	**1.845**	**1.798**	**2.886**	**2092.655**

Conversion factors	
Grams to tons	1.102E-06

CALCULATION SHEET-TRANSPORTATION COMBUSTION EMISSIONS-CONSTRUCTION-SANTA CRUZ COUNTY

Construction Worker Personal Vehicle Commuting to Construction Site-Passenger and Light Duty Trucks									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of cars	Number of trucks	Total Emissions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	60	320	20	20	0.58	0.68	1.26
CO	12.4	15.7	60	320	20	20	5.25	6.64	11.89
NOx	0.95	1.22	60	320	20	20	0.40	0.52	0.92
PM-10	0.0052	0.0065	60	320	20	20	0.00	0.00	0.00
PM 2.5	0.0049	0.006	60	320	20	20	0.00	0.00	0.00
CO2	369	511	60	320	20	20	156.15	216.24	372.39

Heavy Duty Trucks Delivery Supply Trucks to Construction Site									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	10,000-19,500 lb Delivery Truck	33,000-60,000 lb semi trailer rig	Mile/day	Day/yr	Number of trucks	Number of trucks	Total Emissions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	0.29	0.55	60	320	2	2	0.01	0.02	0.04
CO	1.32	3.21	60	320	2	2	0.06	0.14	0.19
NOx	4.97	12.6	60	320	2	2	0.21	0.53	0.74
PM-10	0.12	0.33	60	320	2	2	0.01	0.01	0.02
PM 2.5	0.13	0.36	60	320	2	2	0.01	0.02	0.02
CO2	536	536	60	320	2	2	22.68	22.68	45.36
Commute of Staff Maintaining Towers Associated with Proposed Action									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of Cars	Number of trucks	Total Emissions cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	80	272		1	-	0.04	0.04
CO	12.4	15.7	80	272		1	-	0.38	0.38
NOx	0.95	1.22	80	272		1	-	0.03	0.03
PM-10	0.0052	0.0065	80	272		1	-	0.00	0.00
PM 2.5	0.0049	0.006	80	272		1	-	0.00	0.00
CO2	369	511	80	272		1	-	12.25	12.25

Truck Emission Factor Source: MOBILE6.2 USEPA 2005 Emission Facts: Average annual emissions and fuel consumption for gasoline-fueled passenger cars and light trucks. EPA 420-F-05-022 August 2005. Emission rates were generated using MOBILE.6 highway.

OPERATION EMISSIONS FROM 25kW PROPANE GENERATOR

Assumptions for Combustion Emissions					
Type of Construction Equipment	Num. of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Propane-off grid	2	30	8	365	175200
Propane-on grid	2	30	1	12	720

Emission Factors							
Type of Construction Equipment	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr	CO2 g/hp-hr
Propane Generator Set	2.03	31.91	9.93	0.06	0.06	0.01	653.9

Emission factors (EF) were generated from the NONROAD2005 model for the 2006 calendar year. The VOC EFs includes exhaust and evaporative emissions. The VOC evaporative components included in the NONROAD2005 model are diurnal, hotsoak, running loss, tank permeation, hose permeation, displacement, and spillage. The construction equipment age distribution in the NONROAD2005 model is based on the population in U.S. for the 2006 calendar year.

Emission Calculations							
Type of Construction Equipment	VOC tons/yr	CO tons/yr	NOx tons/yr	PM-10 tons/yr	PM-2.5 tons/yr	SO2 tons/yr	CO2 tons/yr
Propoane Generator Set-off grid	0.393	6.162	1.917	0.011	0.011	0.002	126.240
Propoane Generator Set-on grid	0.002	0.025	0.008	0.000	0.000	0.000	0.519
Total Emissions	**0.394**	**6.187**	**1.925**	**0.011**	**0.011**	**0.002**	**126.759**

Conversion factors	
Grams to tons	1.102E-06

CALCULATION SHEET-FUGITIVE DUST-CONSTRUCTION-SANTA CRUZ COUNTY

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM10/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM10/acre-month	MRI 1996; EPA 2001; EPA 2006

PM2.5 Emissions

PM2.5 Multiplier	0.10	(10% of PM10 emissions assumed to be PM2.5)	EPA 2001; EPA 2006
Control Efficiency	0.50	(assume 50% control efficiency for PM10 and PM2.5 emissions)	EPA 2001; EPA 2006

Project Assumptions

Construction Area (0.19 ton PM10/acre-month)

Duration of Construction Project	1.5	months	**Conversion Factors**	
Length		miles	0.000022957	acres per feet
Length (converted)	0	feet	5280	feet per mile
Width		feet		
Area	9.00	acres		

Assume that each site is equal to or less than 1 acre and each tower will require 6 weeks of construction

Road Construction & Improvements

Duration of Construction Project	1	months
Length	4	miles
Length (converted)	21120	feet
Width	16	feet
Area	7.76	acres

Assume that road impovements complete 4 miles per month

	Project Emissions (tons/year)			
	PM10 uncontrolled	**PM10 controlled**	**PM2.5 uncontrolled**	**PM2.5 controlled**
Construction Area (0.19 ton PM10/ac	2.57	1.28	0.26	0.13
Road Construction & Improvements	3.26	1.63	0.33	0.16
Total	**5.82**	**2.91**	**0.58**	**0.29**

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM10/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM10/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM10/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions from Construction Operations, calculated the 0.19 ton PM10/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM10/acre-month) and 75% of the average emission factor (0.11 ton PM10/acre-month).

The 0.19 ton PM10/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM10/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particle (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District and the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM10 and PM2.5 in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM10/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM10/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

PM2.5 Multiplier **0.10**

PM2.5 emissions are estimated by applying a particle size multiplier of 0.10 to PM10 emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM10 and PM2.5 **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM10 and PM2.5 in PM nonattainment areas. Wetting controls will be applied during project construction (EPA 2006).

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

CALCULATION SHEET-SUMMARY OF EMISSIONS-SANTA CRUZ COUNTY

Proposed Action Construction Emissions for Criteria Pollutants (tons per year)									
Emission Source	VOC	CO	NOx	PM-10	PM-2.5	**SO2**	**CO2**	**CO2 Equivalents**	**Total CO2**
Combustion Emissions	2.26	8.96	23.76	1.84	1.80	2.89	2092.66	7445.43	9538.09
Construction Site-Fugitive PM-10	NA	NA	NA	2.91	0.29	NA	NA	NA	NA
Construction Workers Commuter & Trucking	1.29	12.08	1.66	0.02	0.03	NA	372.39	549.12	921.51
Total emissions-CONSTRUCTION	**3.55**	**21.04**	**25.42**	**4.78**	**2.11**	**2.89**	**2,465**	**7,995**	**10,460**
Propane Generators	0.39	6.19	1.92	0.01	0.01	0.00	126.76	608	735
Maintenance commute	0.04	0.38	0.03	0.00	0.00	NA	12.25	10.06	22.32
Total Emissions-OPERATIONS	**0.43**	**6.56**	**1.95**	**0.01**	**0.01**	**0.00**	**139.01**	**618**	**757**
De minimis Thresholds	100	100	100	100	100	100			27,557

1. Santa Cruz County is in non-attainment for PM-10 and PM-2.5.

Carbon Equivalents	Conversion Factor
N2O or NOx	311
Methane or VOCs	25

Source: EPA 2010 Reference, Tables and Conversions, Inventory of U.S. Greenhouse Gas Emissions and Sinks; http://www.epa.gov/climatechange/emissions/usinventoryreport.html

CALCULATION SHEET-COMBUSTION EMISSIONS-CONSTRUCTION-YUMA COUNTY

Assumptions for Combustion Emissions					
Type of Construction Equipment	Num. of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Water Truck	2	300	8	320	1536000
Diesel Road Compactors	1	100	8	60	48000
Diesel Dump Truck	2	300	8	60	288000
Diesel Excavator	1	300	8	30	72000
Diesel Hole Trenchers	2	175	8	180	504000
Diesel Bore/Drill Rigs	2	300	8	180	864000
Diesel Cement & Mortar Mixers	1	300	8	180	432000
Diesel Cranes	2	175	8	180	504000
Diesel Graders	2	300	8	60	288000
Diesel Tractors/Loaders/Backhoes	2	100	8	60	96000
Diesel Bulldozers	1	300	8	60	144000
Diesel Front-End Loaders	1	300	8	60	144000
Diesel Forklifts	2	100	8	30	48000
Diesel Generator Set	2	40	8	365	233600

Emission Factors							
Type of Construction Equipment	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr	CO2 g/hp-hr
Water Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Road Compactors	0.370	1.480	4.900	0.340	0.330	0.740	536.200
Diesel Dump Truck	0.440	2.070	5.490	0.410	0.400	0.740	536.000
Diesel Excavator	0.340	1.300	4.600	0.320	0.310	0.740	536.300
Diesel Trenchers	0.510	2.440	5.810	0.460	0.440	0.740	535.800
Diesel Bore/Drill Rigs	0.600	2.290	7.150	0.500	0.490	0.730	529.700
Diesel Cement & Mortar Mixers	0.610	2.320	7.280	0.480	0.470	0.730	529.700
Diesel Cranes	0.440	1.300	5.720	0.340	0.330	0.730	530.200
Diesel Graders	0.350	1.360	4.730	0.330	0.320	0.740	536.300
Diesel Tractors/Loaders/Backhoes	1.850	8.210	7.220	1.370	1.330	0.950	691.100
Diesel Bulldozers	0.360	1.380	4.760	0.330	0.320	0.740	536.300
Diesel Front-End Loaders	0.380	1.550	5.000	0.350	0.340	0.740	536.200
Diesel Fork-Lifts	1.980	7.760	8.560	1.390	1.350	0.950	690.800
Diesel Generator Set	1.210	3.760	5.970	0.730	0.710	0.810	587.300

CALCULATION SHEET-COMBUSTION EMISSIONS-CONSTRUCTION-YUMA COUNTY

Emission factors (EF) were generated from the NONROAD2005 model for the 2006 calendar year. The VOC EFs includes exhaust and evaporative emissions. The VOC evaporative components included in the NONROAD2005 model are diurnal, hotsoak, running loss, tank permeation, hose permeation, displacement, and spillage. The construction equipment age distribution in the NONROAD2005 model is based on the population in U.S. for the 2006 calendar year.

Emission Calculations							
Type of Construction Equipment	VOC tons/yr	CO tons/yr	NOx tons/yr	PM-10 tons/yr	PM-2.5 tons/yr	SO2 tons/yr	CO2 tons/yr
Water Truck	0.745	3.504	9.293	0.694	0.677	1.253	907.272
Diesel Road Paver	0.020	0.078	0.259	0.018	0.017	0.039	28.363
Diesel Dump Truck	0.140	0.657	1.742	0.130	0.127	0.235	170.114
Diesel Excavator	0.027	0.103	0.365	0.025	0.025	0.059	42.552
Diesel Hole Cleaners\Trenchers	0.283	1.355	3.227	0.255	0.244	0.411	297.588
Diesel Bore/Drill Rigs	0.571	2.180	6.808	0.476	0.467	0.695	504.342
Diesel Cement & Mortar Mixers	0.290	1.104	3.466	0.229	0.224	0.348	252.171
Diesel Cranes	0.244	0.722	3.177	0.189	0.183	0.405	294.477
Diesel Graders	0.111	0.432	1.501	0.105	0.102	0.235	170.209
Diesel Tractors/Loaders/Backhoes	0.196	0.869	0.764	0.145	0.141	0.101	73.113
Diesel Bulldozers	0.057	0.219	0.755	0.052	0.051	0.117	85.104
Diesel Front-End Loaders	0.060	0.246	0.793	0.056	0.054	0.117	85.089
Diesel Aerial Lifts	0.105	0.410	0.453	0.074	0.071	0.050	36.541
Diesel Generator Set	0.311	0.968	1.537	0.188	0.183	0.209	151.187
Total Emissions	**3.161**	**12.848**	**34.140**	**2.635**	**2.565**	**4.273**	**3098.121**

Conversion factors	
Grams to tons	1.102E-06

CALCULATION SHEET-TRANSPORTATION COMBUSTION EMISSIONS-CONSTRUCTION-YUMA COUNTY

Construction Worker Personal Vehicle Commuting to Construction Site-Passenger and Light Duty Trucks									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of cars	Number of trucks	Total Emissions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	60	320	20	20	0.58	0.68	1.26
CO	12.4	15.7	60	320	20	20	5.25	6.64	11.89
NOx	0.95	1.22	60	320	20	20	0.40	0.52	0.92
PM-10	0.0052	0.0065	60	320	20	20	0.00	0.00	0.00
PM 2.5	0.0049	0.006	60	320	20	20	0.00	0.00	0.00
CO2	369	511	60	320	20	20	156.15	216.24	372.39

Heavy Duty Trucks Delivery Supply Trucks to Construction Site									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	10,000-19,500 lb Delivery Truck	33,000-60,000 lb semi trailer rig	Mile/day	Day/yr	Number of trucks	Number of trucks	Total Emissions Cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	0.29	0.55	60	320	2	2	0.01	0.02	0.04
CO	1.32	3.21	60	320	2	2	0.06	0.14	0.19
NOx	4.97	12.6	60	320	2	2	0.21	0.53	0.74
PM-10	0.12	0.33	60	320	2	2	0.01	0.01	0.02
PM 2.5	0.13	0.36	60	320	2	2	0.01	0.02	0.02
CO2	536	536	60	320	2	2	22.68	22.68	45.36
Commute of Staff Maintaining Towers Associated with Proposed Action									
	Emission Factors		Assumptions				Results by Pollutant		
Pollutants	Passenger Cars g/mile	Pick-up Trucks, SUVs g/mile	Mile/day	Day/yr	Number of Cars	Number of trucks	Total Emissions cars tns/yr	Total Emissions Trucks tns/yr	Total tns/yr
VOCs	1.36	1.61	80	300		1	-	0.04	0.04
CO	12.4	15.7	80	300		1	-	0.42	0.42
NOx	0.95	1.22	80	300		1	-	0.03	0.03
PM-10	0.0052	0.0065	80	300		1	-	0.00	0.00
PM 2.5	0.0049	0.006	80	300		1	-	0.00	0.00
CO2	369	511	80	300		1	-	13.51	13.51

Truck Emission Factor Source: MOBILE6.2 USEPA 2005 Emission Facts: Average annual emissions and fuel consumption for gasoline-fueled passenger cars and light trucks. EPA 420-F-05-022 August 2005. Emission rates were generated using MOBILE.6 highway.

OPERATION EMISSIONS FROM 25kW PROPANE GENERATOR

Assumptions for Combustion Emissions					
Type of Construction Equipment	Num. of Units	HP Rated	Hrs/day	Days/yr	Total hp-hrs
Propane-off grid	4	30	8	365	350400
Propane-on grid	10	30	1	12	3600

Emission Factors							
Type of Construction Equipment	VOC g/hp-hr	CO g/hp-hr	NOx g/hp-hr	PM-10 g/hp-hr	PM-2.5 g/hp-hr	SO2 g/hp-hr	CO2 g/hp-hr
Propane Generator Set	2.03	31.91	9.93	0.06	0.06	0.01	653.9

Emission factors (EF) were generated from the NONROAD2005 model for the 2006 calendar year. The VOC EFs includes exhaust and evaporative emissions. The VOC evaporative components included in the NONROAD2005 model are diurnal, hotsoak, running loss, tank permeation, hose permeation, displacement, and spillage. The construction equipment age distribution in the NONROAD2005 model is based on the population in U.S. for the 2006 calendar year.

Emission Calculations							
Type of Construction Equipment	VOC tons/yr	CO tons/yr	NOx tons/yr	PM-10 tons/yr	PM-2.5 tons/yr	SO2 tons/yr	CO2 tons/yr
Propoane Generator Set-off grid	0.786	12.324	3.833	0.022	0.022	0.005	252.480
Propoane Generator Set-on grid	0.008	0.127	0.039	0.000	0.000	0.000	2.594
Total Emissions	**0.794**	**12.450**	**3.873**	**0.022**	**0.022**	**0.005**	**255.074**

Conversion factors	
Grams to tons	1.102E-06

CALCULATION SHEET-FUGITIVE DUST-CONSTRUCTION-yuma COUNTY

Construction Fugitive Dust Emissions

Construction Fugitive Dust Emission Factors

	Emission Factor	Units	Source
General Construction Activities	0.19	ton PM10/acre-month	MRI 1996; EPA 2001; EPA 2006
New Road Construction	0.42	ton PM10/acre-month	MRI 1996; EPA 2001; EPA 2006

PM2.5 Emissions

PM2.5 Multiplier	0.10	(10% of PM10 emissions assumed to be PM2.5)	EPA 2001; EPA 2006
Control Efficiency	0.50	(assume 50% control efficiency for PM10 and PM2.5 emissions)	EPA 2001; EPA 2006

Project Assumptions

Construction Area (0.19 ton PM10/acre-month)

Duration of Construction Project	1.5	months	**Conversion Factors**	
Length		miles	0.000022957	acres per feet
Length (converted)	0	feet	5280	feet per mile
Width		feet		
Area	9.00	acres		

Assume that each site is equal to or less than 1 acre and each tower will require 6 weeks of construction

Road Construction & Improvements

Duration of Construction Project	1	months
Length	4	miles
Length (converted)	21120	feet
Width	16	feet
Area	7.76	acres

Assume that road impovements complete 4 miles per month

	Project Emissions (tons/year)			
	PM10 uncontrolled	**PM10 controlled**	**PM2.5 uncontrolled**	**PM2.5 controlled**
Construction Area (0.19 ton PM10/ac	2.57	1.28	0.26	0.13
Road Construction & Improvements	3.26	1.63	0.33	0.16
Total	**5.82**	**2.91**	**0.58**	**0.29**

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

Construction Fugitive Dust Emission Factors

General Construction Activities Emission Factor

0.19 ton PM10/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The area-based emission factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) Improvement of Specific Emission Factors (BACM Project No. 1), March 29, 1996. The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.11 ton PM10/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 ton PM10/acre-month was calculated for sites with active large-scale earth moving operations. The monthly emission factors are based on 168 work-hours per month (MRI 1996). A subsequent MRI Report in 1999, Estimating Particulate Matter Emissions from Construction Operations, calculated the 0.19 ton PM10/acre-month emission factor by applying 25% of the large-scale earthmoving emission factor (0.42 ton PM10/acre-month) and 75% of the average emission factor (0.11 ton PM10/acre-month).

The 0.19 ton PM10/acre-month emission factor is referenced by the EPA for non-residential construction activities in recent procedures documents for the National Emission Inventory (EPA 2001; EPA 2006). The 0.19 ton PM10/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particle (TSP) emission factor in Section 13.2.3 Heavy Construction Operations. In addition to the EPA, this methodology is also supported by the South Coast Air Quality Management District and the Western Regional Air Partnership (WRAP) which is funded by the EPA and is administered jointly by the Western Governor's Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities including building construction (commercial, industrial, institutional, governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory documentation assumes that the emission factors are uncontrolled and recommends a control efficiency of 50% for PM10 and PM2.5 in PM nonattainment areas.

New Road Construction Emission Factor

0.42 ton PM10/acre-month Source: MRI 1996; EPA 2001; EPA 2006

The emission factor for new road construction is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM10/acre-month). It is assumed that road construction involves extensive earthmoving and heavy construction vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 ton PM10/acre-month emission factor for road construction is referenced in recent procedures documents for the EPA National Emission Inventory (EPA 2001; EPA 2006).

PM2.5 Multiplier **0.10**

PM2.5 emissions are estimated by applying a particle size multiplier of 0.10 to PM10 emissions. This methodology is consistent with the procedures documents for the National Emission Inventory (EPA 2006).

Control Efficiency for PM10 and PM2.5 **0.50**

The EPA National Emission Inventory documentation recommends a control efficiency of 50% for PM10 and PM2.5 in PM nonattainment areas. Wetting controls will be applied during project construction (EPA 2006).

References:

EPA 2001. *Procedures Document for National Emissions Inventory, Criteria Air Pollutants, 1985-1999.* EPA-454/R-01-006. Office of Air Quality Planning and Standards, United States Environmental Protection Agency. March 2001.

EPA 2006. *Documentation for the Final 2002 Nonpoint Sector (Feb 06 version) National Emission Inventory for Criteria and Hazardous Air Pollutants.* Prepared for: Emissions Inventory and Analysis Group (C339-02) Air Quality Assessment Division Office of Air Quality Planning and Standards, United States Environmental Protection Agency. July 2006.

MRI 1996. *Improvement of Specific Emission Factors (BACM Project No. 1).* Midwest Research Institute (MRI). Prepared for the California South Coast Air Quality Management District, March 29, 1996.

CALCULATION SHEET-SUMMARY OF EMISSIONS-YUMA COUNTY

Proposed Action Construction Emissions for Criteria Pollutants (tons per year)									
Emission Source	VOC	CO	NOx	PM-10	PM-2.5	**SO2**	**CO2**	**CO2 Equivalents**	**Total CO2**
Combustion Emissions	3.16	12.85	34.14	2.64	2.57	4.27	3098.12	10696.58	13794.71
Construction Site-Fugitive PM-10	NA	NA	NA	2.91	0.29	NA	NA	NA	NA
Construction Workers Commuter & Trucking	1.29	12.08	1.66	0.02	0.03	NA	372.39	549.12	921.51
Total emissions-CONSTRUCTION	**4.45**	**24.93**	**35.80**	**5.57**	**2.88**	**4.27**	**3,471**	**11,246**	**14,716**
Propane Generators	0.79	12.45	3.87	0.02	0.02	0.00	255.07	1,224	1,479
Maintenance commute	0.04	0.42	0.03	0.00	0.00	NA	13.51	11.10	24.61
Total Emissions-OPERATIONS	**0.84**	**12.87**	**3.91**	**0.02**	**0.02**	**0.00**	**268.59**	**1,235**	**1,504**
De minimis Thresholds	100	100	100	100	100	100			27,557

1. Cochise County is in non-attainment for PM-10.

Carbon Equivalents	Conversion Factor
N2O or NOx	311
Methane or VOCs	25

Source: EPA 2010 Reference, Tables and Conversions, Inventory of U.S. Greenhouse Gas Emissions and Sinks; http://www.epa.gov/climatechange/emissions/usinventoryreport.html